









BRITISH MUSEUM (NATURAL HISTORY)

*Dept. of Entomology.  
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# INSECTS OF SAMOA

## AND OTHER SAMOAN TERRESTRIAL ARTHROPODA

### PART III. LEPIDOPTERA

FASC. 3. Pp. 117-168

#### GEOMETRIDAE

By LOUIS B. PROUT, F.E.S.

WITH TWO TEXT-FIGURES AND ONE PLATE



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# INSECTS OF SAMOA

## AND OTHER SAMOAN TERRESTRIAL ARTHROPODA

Although a monograph, or series of papers, dealing comprehensively with the land arthropod fauna of any group of islands in the South Pacific may be expected to yield valuable results, in connection with distribution, modification due to isolation, and other problems, no such work is at present in existence. In order in some measure to remedy this deficiency, and in view of benefits directly accruing to the National Collections, the Trustees of the British Museum have undertaken the publication of an account of the Insects and other Terrestrial Arthropoda collected in the Samoan Islands, in 1924-1925, by Messrs. P. A. Buxton and G. H. E. Hopkins, during the Expedition of the London School of Hygiene and Tropical Medicine to the South Pacific. Advantage has been taken of the opportunity thus afforded, to make the studies as complete as possible by including in them all Samoan material of the groups concerned in both the British Museum (Natural History) and (by courtesy of the authorities of that institution) the Bishop Museum, Honolulu.

It is not intended that contributors to the text shall be confined to the Museum Staff or to any one nation, but, so far as possible, the assistance of the leading authorities on all groups to be dealt with has been obtained.

The work will be divided into eight "Parts" (see p. 3 of wrapper), which will be subdivided into "Fascicles." Each of the latter, which will appear as ready in any order, will consist of one or more contributions. On the completion of the work it is intended to issue a general survey, summarising the whole and drawing from it such conclusions as may be warranted.

E. E. AUSTEN,  
*Keeper of Entomology.*

BRITISH MUSEUM (NATURAL HISTORY),  
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## Gustav Fischer, Verlagsbuchhandlung, Jena.

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Die Spanner der Polynesischen Region und der östlichen melanesischen Inseln sind sehr unvollständig bekannt. Nur Neu-Seeland und Hawaii sind besser bekannt. Samoa und Tonga haben ihre Geometriden von Westen her erhalten. Die ganze indo-australische Spannerfauna ist sehr homogen. Die Gattungen und zum Teil selbst die Arten sind sehr weit verbreitet. Von den 18 auf Samoa gefundenen Gattungen ist keine endemisch oder von beschränkter Verbreitung. Von Arten und Subspecies sind nur 10 auf Samoa beschränkt, von denen 9 als neu beschrieben werden.

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(Berlin-Steglitz)

Zentralblatt für Bakteriologie

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# INSECTS OF SAMOA

## PART III. FASC. 3

### GEOMETRIDAE

BY LOUIS B. PROUT, F.E.S.

(With 2 Text-figures, and 1 Plate.)

EXISTING knowledge of the GEOMETRIDAE of the Samoan Islands is totally inadequate, and indeed scarcely extends beyond the few species collected by Woodford at Apia, Upolu, and described by Warren (*Nov. Zool.*, iv, 1897) from types in the Tring Museum, and the few—partly of uncertain determination—recorded by Rebel (*Denkschr. K. Akad. Wiss. Wien, Math.-Naturw. Kl.*, lxxxv, 1910; *Jahrb. Hamb. Wies. Anstalt*, xxxii, *Beiheft* 2, 1915). Rebel's two memoirs are further of value as containing some topographical and bibliographical notes, but these do not concern the GEOMETRIDAE in particular.

As to the Geometrid fauna of Polynesia in general and of the most easterly islands of Melanesia, our present information is equally fragmentary, excepting only as regards New Zealand at one extreme and the Hawaiian Islands at the other. Mr. Meyrick (*Fauna Hawaiensis*, i, (2), 124 *seq.* 1899) has made some very interesting and thought-provoking comparisons, suggesting certain ancestral connections between the New Zealand and Hawaiian Lepidoptera; but it seems clear that Samoa (together with Tonga) has received its GEOMETRIDAE from the west, and there is no need, on the present occasion, to make more than a passing reference to those connections. With the Fijian species there are some definite affinities; but indeed the general homogeneity of the great Indo-Australian fauna (omitting the Subantarctic and North Pacific elements) is strikingly shown by the very close generic agreements, and even in some cases, so far as can at present be determined, by the actual identity of species (*e.g.* *Anisodes obliuaria*, *Eupithecia eupitheciata*, *Micrulia tenuilinea*, *Gymnoscelis refusaria*, *Orsonoba clelia*).



The thirty species now known to occur in the Samoan Islands belong to eighteen genera, none of which are endemic or even restricted in their geographical range. A brief note on each genus from this point of view is given in its place, although it must be admitted that, notwithstanding the work of the last forty years, the taxonomy of the family does not yet rest, in all respects, on a very stable basis. As regards the species or subspecies themselves, ten at least are confined to Samoa, nine of these being here described as new; coloured figures will be given in Part III, Fascicle 4.

### HEMITHEINAE.

In the collection before me, this subfamily is represented by only two genera and, with the exception of a solitary specimen of *Pyrrhorachis*, by *Thalassodes* alone. *Agathia*, *Anisozyga* (?) and *Comibaena*, which reach Fiji (*Agathia dimota* Prout, *Anisozyga pacifica* Felder,\* *Comibaena cheramota* Meyrick), and *Mesurodes*, only known to occur in Fiji, would be not unlikely additions, but most of the widely distributed genera seem to extend no further east than the Solomon Is.

#### *Thalassodes* Guenée.

*Spec. Gén. Lép.*, ix, 359, 1858.—Meyrick, *Trans. Ent. Soc. Lond.*, 1886, p. 204, 1886.—Prout, *Gen. Ins.* 129, p. 151, 1912; *Lep. Cat.* 14, pp. 95–97, 1913.

Distributed throughout India, Malaya, Melanesia and Polynesia, with a few wide-ranging species even in Africa. The Pacific Islands have long been known as the habitat of three of the species, *T. pilaria* Guenée, *T. chloropis* Meyrick, and *T. timoclea* Druce, all of which, indeed, have already been recorded from Fiji, so that their occurrence in Samoa is not surprising. Together with many other members of this genus, they are almost identical in markings, so that their discrimination one from another, to say nothing of possibilities of racial variation and of the differentiation of further species within the same group, presents problems of considerable intricacy, especially since a large part of the available material is in a more or less defective condition. I believe I can distinguish four Samoan species, apart from the striking novelty about to be described and a few indeterminate specimens.

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\* As Felder's unique type is exceedingly like the common *A. pieroides* Walker, of Australia, there may be some error regarding its locality.



1. *Thalassodes charops*, sp. n.

♂♀, 53–54 mm. Face green. Palpus in ♂  $1\frac{1}{4}$ , in ♀ over  $1\frac{1}{2}$ , terminal segment in both sexes moderately elongate, about  $\frac{2}{3}$  of second segment; green, beneath white. Vertex and base of antenna white; occiput green. Thorax and abdomen above green, with a conspicuous whitish longitudinal line; beneath and at extremity white. Legs white, the anterior brown on inner side; hind tibia in ♂ dilated, with hair-pencil, terminal process reaching middle of first tarsal segment.

*Fore wing* with apex rather acute, termen oblique, almost straight, very faintly sinuous, tornus pronounced;  $M^1$  separate; American green, with short and not very copious white strigulae; costal margin white, mostly as far as C, at base only very narrowly; lines white, very slender; antemedian weak, very oblique outwards, anteriorly obsolete; postmedian straightish; fringe white. *Hind wing* with termen only very weakly bent in middle;  $M^1$  stalked; concolorous with fore wing; a white cell-spot, slightly angular on base of  $R^2$ , slenderly outlined with brown-red; postmedian line of the normal *Thalassodes* form, but very weak posteriorly; fringe white.

Under side much paler, not strigulated; the white markings showing faintly; fringes white.

Upolu: Malololelei, 2,000 feet, type ♂, 30.vi.1924; allotype ♀, 21.xi.1924.

Savaii: Fagamalo, 1 ♀, 1925.

A fine species, not manifestly closely allied to any other. *Thalassodes leucoceraea* Prout, 1925 (Malay Peninsula), and *T. floccosa* Prout, 1917 (Malay Peninsula and Java), share with it the white cell-spot of the hind wing, but otherwise their shape, the non-separation of  $M^1$  of the fore wing and the different scheme of markings suggest that the present species has been independently evolved. The whole genus, even including its few African representatives, is very homogeneous.

This species will be figured, in colour, on a plate which will appear in Part III, Fascicle 4.

2. *Thalassodes chloropis* Meyrick.

*Thalassodes chloropis* Meyrick, *Trans. Ent. Soc. Lond.*, 1886, p. 204, 1886 (Fiji).

? "*Thalassodes veraria* Guenée" (Bethune-Baker, *Proc. Zool. Soc. Lond.*, 1905, p. 94, 1905 (Fiji)).

Upolu: Malololelei, 1 ♂, 22.iii.1924, 1 ♀, 22.ii.1924, 3 ♀♀, 24.ii.1924, 3 ♀♀, 21.iv.1924, 2,000 feet; Apia, Vailima, 1 ♀, 14.viii.1922 (Armstrong); Apia,



1 ♀, 30.vi.1924, 1 ♀, 2.ix.1924, 1 ♀, 30.x.1924, 1 ♀, 18.viii.1925, 1 ♀, x.1925, 1,000 feet, 1 ♀, undated (Woodford), in coll. Mus. Tring.

Tutuila : Pago Pago, 3 ♀♀, i.1924, 2 ♀♀, x.1923 (Steffany).

Apart from Fiji, *T. chloropis* was previously known to have been found in Tonga (Friendly Islands). The *T. "chloropis"* recorded from the Jaintia Hills by Hampson has of course nothing to do with the present species, but is that which Swinhoe later (1902) named *T. curiosa*. The Samoan specimens, or at least those from Tutuila, may differ racially from the name-typical in having the postmedian line rather broader; but few good specimens (and none such from Fiji) are yet known to me. A ♀ from the Vavau Group, Tonga, in Mus. Tring, more nearly resembles *Th. timoclea* Druce (*vide infra*) in colour and maculation. The genus *Thalassodes* in general, and the present section in particular, will repay very careful study and analysis when sufficient material can be brought together.

### 3. *Thalassodes timoclea* Druce.

*Proc. Zool. Soc. Lond.*, 1888, p. 227, t. xiii, f. 6, 7, 1888 (Fiji).

Upolu : Apia, 1 ♀, 27.vi.1924.

The distinctive characters of this species are somewhat problematical, since the band on the ♀ described by Druce, upon which he largely relied, was evidently the result of some injury, possibly in the pupal state. The ♂, however, which was first described and must certainly be treated as the holotype, differs essentially from the other and larger green-faced Fijian *Thalassodes* (*T. chloropis* Meyrick) in having the third segment of the palpus shorter. Its hind legs are lost, but there is a small abdominal spine. I refer provisionally to *T. timoclea*, the present ♀, which is not in very good condition but apparently agrees closely with Druce's types. Apart from the palpus, it differs from the Samoan forms of *T. chloropis* in the slightly brighter (less blue) green colouring, and the extremely fine postmedian line, which moreover is perhaps rather more proximally placed than is usual in *T. chloropis*; the white dorsal line on the abdomen is distinct.

### 4. *Thalassodes*, sp.

Upolu : Malololelei, 1 ♂, 1.vii.1924 (Armstrong).

The specimen is hopelessly discoloured: the terminal segment of the palpus certainly shorter than in *T. chloropis* and apparently even than in *T.*



*timoclea*, the hind tibial process vestigial (in *T. chloropis* well developed), M<sup>1</sup> of the fore wing just stalked (in *T. timoclea* and generally in *T. chloropis* separate). The face appears to have been green. The wing-length slightly exceeds that of *T. chloropis*, the apex of the fore wing is minutely produced, its termen almost straight, moderately oblique, and the bend in the mid-termen of the hind wing is weak.

### 5. *Thalassodes pilaria* Guenée.

*Thalassodes pilaria* Guenée, *Spec. Gén. Léop.*, ix, 361, t. xv, f. 2, 1858 (Tahiti).

“*Thalassodes quadraria* Guenée,” Rebel, *Denkschr. K. Akad. Wiss. Wien, Math.-Naturw. Kl.*, lxxv, 428, 1910 (Samoa).

Upolu : Apia, 1 ♀, 13.ix.1923 (Swezey and Wilder) ; 1 ♀, 14.ix.1923 (Swezey and Wilder) ; 2 ♂♂, 2 ♀♀, undated (Woodford) ; 1 ♂, 1 ♀ in Mus. Tring, 2.xi.1924, 1 ♀, vi.1925 ; 1 ♀ (very worn).

Tutuila : Pago Pago, 1 ♂, i.1924 (Steffany), 1 ♂.

Manua : Tau, 3 ♂♂, 20, 23.ii.1926 (Judd) ; Ofu, 2 ♂♂, 2 ♀♀, 27.ii.1926 (Judd).

This species differs from *T. chloropis* in the face being red-brown (the face in both species is unfortunately very liable to injury), the third segment of the palpus and the terminal process of ♂ hind tibia rather shorter (the process in the ♂ of *T. chloropis* being nearly half as long as the first tarsal segment) and in having M<sup>1</sup> of the fore wing stalked with R<sup>3</sup>. Under the name *T. quadraria*, Rebel writes : “Upolu, 3, of which 1 ♂ Vaimea 7 June and 1 ♀ Malifa 10 June quite agree ; face red-brown, quite as in Indian.” It is perhaps legitimate to conjecture that the third example, not mentioned in greater detail, belonged to *T. chloropis*.

*T. pilaria* is now known to occur in Fiji, Samoa, the Society Islands, and Pitcairn Island. On the first-named islands, according to Veitch and Greenwood (*Proc. Linn. Soc. N. S. Wales*, xlvi, 507, 1921, xlix, 154, 1924), the larva has been found on *Rosa*, sp., *Ricinus communis*, *Inocarpus edulis*, *Mangifera indica*, and *Eugonia indularis*.

### *Pyrrothorachis* Warren.

*Nov. Zool.*, iii, 292, 1896.—Prout, *Gen. Ins.*, 129, p. 238, 1912 ; *Lep. Cat.*, 14, p. 162, 1913.—Turner, *Proc. Linn. Soc. N. S. Wales*, xxxv, 569, 1910 (*Pyrrothorachis*, ex err.).

This compact little genus comprises only a few very closely related species ; certain others of doubtful affinity, provisionally referred to it, would be better



excluded. Thus *P. albifimbria* Warren (1896) and *P. marginata* Warren (1899) should undoubtedly be assigned to *Comostolopsis*; *P. rubripunctata* Warren (1909) would be better placed in *Chloëres*, while the actual affinities of *P. caerulea* Warren (1893) and *P. cosmetocraspeda* Prout (1916) are not yet quite clear. There remain the following species: *P. deliciosa* Warren (1896), founded on a single example from the Natuna Islands and probably a race of the species next in order, *i.e.* *P. pyrrhogona* Walker (1866), of S. India and Ceylon, with subspecies *turgescens* Prout (1917.—Khasi Hills); *P. marginata* T. P. Lucas (1888), of Queensland and the Tenimber Is.; *P. augustata* Prout (1917.—Loyalty Is.); *P. cornuta* Warren (1896), distributed from the Malay Peninsula and the Philippine Is. to the Louisiade Archipelago and the Solomon Is.; *P. viridula* Warren (1903.—British and Dutch New Guinea); *P. rhodometopa* Prout (1913.—Mt. Goliath, Central Dutch New Guinea), possibly a form of the following; *P. ruficeps* Warren (1906.—British and Dutch New Guinea).

The species now described extends the range of the genus eastward into Polynesia. It belongs to the group containing *P. ruficeps* and *P. rhodometopa*—green, with brighter red borders and crown—which is connected by *P. viridula* with the two bluer species, *P. pyrrhogona* and *P. cornuta*.

#### 6. *Pyrrhorachis rhodoselas*, sp. n.

♂, 19 mm. Near *P. ruficeps* Warren (1906) and *P. rhodometopa* Prout (1913). Body, as in the former, with the red dorsal streak not interrupted with green at base of abdomen; its colour still brighter, without pale central dash on thorax posteriorly, but with an indistinct dark dot in the centre of each segment.

*Fore wing* with costal margin brighter red than in the allied species, and less densely dark-irrorated; red distal border intermediate in width, but widening appreciably at tornus, and near its proximal boundary marked throughout with small, deep violet-grey interneural spots; a crescentic yellow cell-mark, scarcely noticeable with the naked eye. *Hind wing* similar, except costally.

Fore wing beneath with costal margin pale pink to whitish, at extreme edge proximally bright rosy, wanting the black admixture seen in the allied species.

Upolu: Apia, type ♂, xii.1924.

This specimen will be figured, in colour, on a plate which will be published with Part III, Fascicle 4.



## STERRHINAE.

This subfamily is represented by four genera comprising seven species, six of which are included in the three largest and most nearly cosmopolitan genera—*Anisodes*, *Scopula*, and *Sterrha*, while the remaining species is a very interesting *Symmacra*. These are the only four Sterrhine genera yet known to extend into the Pacific eastward of the Solomons ; but it is not impossible that representatives of *Organopoda*, *Ptochophyle*, *Chrysocraspeda*, *Problepsis*, or *Bytharia*, all of which reach that group or the Bismarek or Louisiade Archipelagos, may yet be discovered in Polynesia.

*Symmacra* Warren.

*Nov. Zool.*, iii, 116, 1896.

I refer to this genus only four forms, and even so it embraces two distinct sections.

A. (Sect. typ.). Hind tibia in ♂ with strong hair-pencil and two very unequal spurs ; facies of *Discoglypha* : *S. regularis* Warren, 1896, Khasi Hills ; *S. inobtrusa* (Warren), 1897, S. Celebes (pr. subsp. ?).

B. Hind femur of ♂ also hairy, a strong tuft at its base, the tibia usually with only a single spur ; facies of *Dithecodes* : *S. solidaria* Guenée, *Spec. Gén. Léop.*, ix, 348, 1858, Ceylon (*nec auctt. al.*) = *S. quadraequata* Walker, *List Lep. Ins.*, xxiii, 762, 1861, Borneo = *S. validaria* Walker, *List Lep. Ins.*, xxxv, 1607, 1866, Celebes ; *S. solidaria baptata* Warren, *Nov. Zool.*, iv, 224, 1897, Samoa.

"*Symmacra*" *inconspicua* Warren (1899), is not strictly congeneric, but belongs rather to *Dithecodes*.

7. *Symmacra solidaria baptata* (Warren).

*Sterrha* (?) *baptata* Warren, *Nov. Zool.*, iv, 224, 1897 (Apia).

Upolu : Malololelei, 2,000 feet, 1 ♀, 24.ii.1924 ; 1 ♀, 21.iv.1925.

Tutuila : Pago Pago, 3 ♀♀, i.1924 ; 1 ♂, 3 ♀♀, ii.1924 (Steffany).

The author of this species, of which the only specimen hitherto known was the type ♀, failed to detect its affinities. Except in the glistening white, not green, colouring, this form differs little from the very widely distributed *S.*



*solidaria* Guenée, and now that the ♂ has been met with it seems safe to treat it as a race. Both are flushed with reddish on the under side, but in typical *S. solidaria* this suffusion is widely spread and becomes very strong at the costa of the fore wing, while in the race *baptata*, especially in the ♀, it is slighter, chiefly developed in and distally to the cell of the fore wing. On the hind wing the clear white, slightly raised cell-mark extends for the length of DC<sup>2.3</sup>; in typical *S. solidaria* it is reduced and more punctiform.

*S. s. solidaria* is known to me as occurring in Ceylon, Assam, Burma, the Malay Peninsula, W. China, Borneo, Celebes, Java to Lombok, Timor, Wetter I., Buru, Kei Is., New Guinea, Queensland, the D'Entrecasteaux Is., Woodlark I., the Louisiades and Bismarck Archipelagos and Guadalcanar I. It was long known as *S. validaria* Walker, Walker's older name *quadraequata* having been overlooked, and Guenée's *S. solidaria* entirely misidentified. Oberthür's figure of Guenée's type (*Et. Léop. Comp.*, xii, fig. 3215) leaves no doubt about the determination, notwithstanding the poor condition of the specimen and its entirely erroneous generic location as a "*Nemoria*."

### Anisodes Guenée.

*Spec. Gén. Léop.*, ix, 415, 1858.—Hampson, *Faun. Brit. Ind., Moths*, iii, 446, 1895.

Except in the Holarctic Region, where it is replaced by the closely allied *Cosymbia* Hübner, a few islands such as Hawaii and New Zealand, and the southern part of South America, this genus is universally distributed, though less prevalent in Africa than in the Indo-Australian and Neotropical Regions. It is extraordinarily interesting on account of the very great diversity of ♂ secondary sexual characters, on which have been based numerous "genera," better treated for the present as subgenera, though some remarkable divergences in the genitalia suggest that there may be some heterogeneous elements which it will ultimately be necessary to exclude. The ♀♀ are on the whole very stable in structure, and the principal venational variations—presence or absence of areole and approximation or wide separation of M<sup>1</sup> of the hind wing—do not appear to be of generic value. Two species have already been recorded from the Samoan Islands and a third is represented in the present collection, though unfortunately only by a single ♀. A very probable addition is *A. (Brachycola) decolorata* Warren (*Nov. Zool.*, iv, 215, 1897), described from a specimen from Lifu, Loyalty Islands, though a closely similar form is known to occur in Tahiti.



The subgenus *Brachycola* Warren (= "*Perixera* Meyrick" Hampson, *Faun. Brit. Ind., Moths*, iii, 446, 1895, *ex err.*), typified by *A. absconditaria* Walker, of India and Malaya, consists of some six or seven Indo-Australian species, and is characterised by having the ♂ hind tibia extremely short, with a tuft of red hair and 3 long, curved spurs. The subgenus *Pisoraca* Walker (distribution nearly coterminous with that of the genus) has the ♂ hind tibia of normal length but with 3 spurs, and is represented in Fiji by one recently discovered species near—perhaps a race of—*A. compacta* Warren, 1898, a species of which the type was obtained in the Kei Is., though it has since been found to occur throughout a wide area in New Guinea, as also in the Louisiade and Bismarck Archipelagos. Another member of the genus, *A. (Perixera) prionodes* Meyrick (*Tr. Ent. Soc. Lond.*, 1886, p. 209, 1886), was described from a single ♂ from Fiji in the collection of Dr. T. P. Lucas and may be a form of the variable *A. pauper* Butler (*Ann. Mag. Nat. Hist.*, (5), xx, 245, 1887) (Solomon Is.) = *A. syntona* Meyrick (*Tr. Ent. Soc. Lond.*, 1889, p. 487, 1889) (Port Moresby). In the subgenus *Perixera* Meyrick (= *Phrissosceles* Warren) it is the hind *femur* of the ♂ which bears a red tuft, while the tibia is normally formed, with a pair of terminal spurs. A typical (Fijian) *Anisodes*, without appreciable secondary sexual characters and with only terminal spurs on the hind tibia, is likewise a solitary ♂ of a race or close ally of a widely distributed species (New Guinea and the islands eastward, as far as the Solomons) which I believe to be *A. praetermissa* Bastelberger (*Int. Ent. Zeit.* Guben, ii, 38, 1908). I have not yet been able to examine the type of the latter—a single specimen, apparently in poor condition. In addition, some fifteen other *Anisodes* are known to me as occurring in the Solomon Is.: one in the subgenus *Zeugma* Walker = *Dizuga* Warren (♂ hind tibia with 4 spurs), one in *Brachycola*, 7 in typical *Anisodes*, one in *Crypsiplocia* Warren (♂ with costal fold beneath), two in *Plochucha* Warren (♂ with costal fold above), one in *Stibarostoma* (*vide infra*), and two in *Perixera*. The genus probably numbers nearly three hundred species, of which slightly over one-half are Neotropical.

#### 8. *Anisodes (Xenoprora) samoana* (Warren).

*Brachycola samoana* Warren, *Nov. Zool.*, iv, 216, 1897 (Apia, Upolu).

"Samoa," 1 ♂, iii.-viii.1921 (O'Connor); "Pago," 1 ♀, v.1896 (P. de la Garde); both in Mus. Brit. ? Upolu: Malololelei, 2 ♀♀, 24.ii., 6.vii.1924.



Warren founded this species on a single ♀ in Mus. Tring, collected by Woodford. In my manuscripts I had, with a considerable degree of confidence, treated as identical with it *A. parallela* Warren, described ten pages later from a specimen from Lifu, Loyalty Is., and made the type of the genus (subgenus, *vide supra*) *Xenoprora*. This is characterised by the peculiar ♂ palpus, which is short, thick, upcurved and heavily rough-scaled above. In doing as I did I was not far wrong, seeing that the two are unmistakably subspecies or representative species, with identical palpi, even if they do not ultimately prove to be absolute synonyms. But my experience in the matter of *Cleora samoana* and its group (*vide infra*) has made me hesitant with regard to premature unions; and I notice that the only known ♂ of *A. samoana*, besides appearing slightly narrower-winged and more yellowish than the rest of the *Xenoprora* ♂♂ thus far known, shows on the fore wing beneath, at and in front of the end of the cell, a roundish patch of dense, somewhat specialised scaling, of which I cannot discover a trace in any other example. None of the material, however, is in really fresh condition and I would not unduly stress the distinction. The 2 ♀♀ from Malololelei are of a larger, more yellowish-tinged, superficially very different-looking form from Warren's type ♀, but I am inclined to think that they belong to the same species.

Besides the Samoan material detailed above, and the 4 ♂♂ and 3 ♀♀ of *A. parallela* in the Tring Museum, examples of the same species or superspecies are known from Fiji and the Society Islands. From the former group, the Joicey collection contains a ♂ from Viti Levu (Woodford), ex. coll. Druce, of fairly large size, fleshy-tinged rather than yellowish, with the median shade of the fore wing rather strong, and in general agreeing with *A. parallela* rather than with *A. samoana*. A second ♂, on which I made no special notes, has passed through my hands, having been submitted to the Imperial Bureau of Entomology for determination. From the latter group (Tahiti), the British Museum has 2 ♂♂, extremely worn, which perhaps represent another race, since both have a more consolidated and darkened (black-brown) cell-mark on the hind wing.

No other species of *Xenoprora* is known, but the subgenus is clearly the progenitor of *Emmesura* Warren (India to Celebes), which has the same ♂ palpus but contorted ♂ venation. *Stibarostoma* Warren (India to the Solomon Is. and Queensland) has also its ♂ specialisation on the palpus, but in that group the second segment is long. In all three subgenera the areole is obsolete.



9. *Anisodes (Perixera) obliivaria* Walker.

*Anisodes obliivaria* Walker, *List Lep. Ins.*, xxii, 643, 1861 (Ceylon).

*Anisodes suspicaria* Snellen, *Tijd. Ent.*, xxiv, 80, t. viii, f. 6-6 c, 1881 (Celebes).

"*Anisodes obrinaria* Guenée," Moore, *Lep. Ceyl.*, iii, 446, t. cic, f. 4 a, 1887 (*ex err.*).

*Perixera rufidorsata* Warren, *Nov. Zool.*, iii, 312, 1896 ; viii, 24, 1901 (N. India) (ab.).

*Perixera rufannularia* Warren, *Nov. Zool.*, iv, 221, 1897 (Upolu : Apia).

Tutuila : Pago Pago, 1 ♂, i.1924, 1 ♀, x.1923 (Steffany).

I cannot yet see that this very widely distributed species even forms definable races. The extreme ab. *rufidorsata* (with enlarged, broadly dark-ringed cell-spot on the hind wing) is only known to me as occurring in N. India (not infrequently), Java and New Guinea, but nowhere constant ; intermediates are pretty general. I have seen specimens of *A. obliivaria* from Ceylon, India, the Malay Peninsula, Java, Timor, Babar, the Obi Is., Amboina, New Guinea, the Trobriand Is., Woodlark I., the Louisiade Archipelago, Queensland, the Bismarck Archipelago, the Solomon Is. and Samoa. Tring Museum has 1 ♀ from Apia as well as the type ♂ *P. rufannularia*.

10. *Anisodes hypocris*, sp. n.

♀, 33 mm. Head and body concolorous with wings ; the face, upper edge of palpus and part of the fore leg (especially of the coxa) redder. Palpus long (about  $2\frac{1}{2}$ ), the third segment longer than the second.

*Fore wing* with termen crenulate ; areole wanting, R<sup>2</sup> arising before middle of DC, DC<sup>3</sup> incurved anteriorly ; light cinnamon, weakly irrorated with greyish, leaving a clearer postmedian band about 2 mm. in width ; markings rather blurred, greyish ; cell-spot ocellate, though rather small ; antemedian line very obscure, apparently thick or double ; median rather thick, considerably beyond cell-spot, outbent about R<sup>3</sup>-M<sup>1</sup>, slightly incurved before and behind ; postmedian 2-3 mm. from termen, accentuated by minute darker vein-dots, incurved between the radials and again posteriorly ; subterminal indistinct, between vague, somewhat macular dark shades ; terminal dots not strong. *Hind wing* with termen strongly and irregularly crenulate, the longest tooth at R<sup>3</sup>, that at R<sup>1</sup> also rather pronounced ; cell-spot large, white ; median shade rather close beyond it ; distal markings nearly as on fore wing.

Under side considerably paler ; cell-marks indicated, on hind wing white, though less sharply than above ; postmedian dots also indicated, the other markings faint or obsolete.



Upolu : Malololelei, 1 ♀, 21.vi.1924.

Without reference to the ♂, it is not possible to give the subgeneric position, but I conjecture that the present species will prove to be a *Perixera*. The palpus and scheme of markings agree with those of the two most widely distributed members of that group: *P. flavispila* Warren, 1896 (N. India, Burma, Hainan and Hong Kong, with races (?) in Sambawa and Sumba and in Queensland, New Guinea and Fergusson Island, the latter being *P. lophosceles* Turner, 1908); and *P. argyromma* Warren, 1896 (distributed from Ceylon to New Britain). It may even prove a close relative of the latter, notwithstanding its more crenulate margins.

This species will be figured, in colour, on a plate which will appear in Part III, Fascicle 4.

### Scopula Schrank.

*Fauna Boica*, ii. (2), 162, 1802.—*Acidalia* Treitschke, 1825 (nom. praeocc.).—*Leptomeris* Hübner, 1826.—*Arrhostia* Hübner, 1826.—*Craspedia* Hübner, 1826.—*Dosithea* Duponchel, 1829.—*Pylarge* Herrich-Schäffer, 1856.—*Phyletis* Guenée, 1858.—*Lycauges* Butler, 1879.—*Trichoclada* Meyrick, 1886.—*Runeca* Moore, 1888.—*Longula* Staudinger, 1892.—*Cnidia* Gumpenberg, 1892.—*Synelys* Hulst, 1896.—*Induna* Warren, 1897.—*Acidalina* Staudinger, 1897.—*Pleionocentra* Warren, 1898.—*Chlorocraspedia* Warren, 1899.—*Lipocentris* Warren, 1905.

An enormous genus, showing remarkably little structural variation except in secondary sexual characters in the ♂. The ♂ genitalia, whether in the Palaearctic or Nearctic Region, South America, South Africa, Malaya or Tasmania, are quite homogeneous in their essential formation, and all that is yet known of the exotic larvae fully bears out the naturalness of the grouping. Wanting in Chili, Patagonia, New Zealand (excepting one obviously introduced species (*vide* Meyrick, *Tr. N. Z. Inst.*, xvi, 57, 1883) and the Hawaiian Islands, the genus is otherwise more or less strongly represented everywhere, perhaps least prominent in the Neotropical Region. Including a few which are still in manuscript, I know about 470 named species, besides some 50 others which have not yet been worked out.

The species upon which Meyrick founded his genus *Trichoclada*, and which perhaps in some measure connects *Scopula* with the allied genus *Problepsis* Lederer, is only known as occurring in Fiji: *epigypsa* Meyrick, *Tr. Ent. Soc. Lond.*, 1886, p. 208 (*Trichoclada*) = *nivipennis* Butler, *Tr. Ent. Soc. Lond.*, 1886, p. 436 (*Idaea*) = *cernea* Druce, *Proc. Zool. Soc. Lond.*, 1888, p. 227, t. xiii, f. 8 (*Acidalia*). Two other species, belonging to the central group of *Scopula*,

inhabit the Loyalty Is., namely : *S. undilinea* Warren, 1900, only known from a specimen from Lifu, though Swinhoe (*Tr. Ent. Soc. Lond.*, 1902, p. 657) quite erroneously treated it as identical with *S. cretata* Warren (*i.e.* *S. destituta* Walker, 1866, Sula Is.); and *S. oppilata* Walker, 1861 = *S. crossophragma* Meyrick, 1886, which is known also to occur in Toekan Besi, Celebes, from Bali to the Tenimber Is., in Queensland, New South Wales, Kei Is., Amboina, New Guinea, the Bismarck Archipelago and the Solomon Is. The species are mostly small and not particularly attractive, and in all probability several additional ones will be found in the Pacific.

### 11. *Scopula homodoxa* (Meyrick).

*Acidalia homodoxa* Meyrick, *Tr. Ent. Soc. Lond.*, 1886, p. 208, 1886 (Tonga).

? "*Craspedia remotota* [sic] Guenée," Rebel, *Denkschr. K. Akad. Wiss. Wien, Math.-Naturw. Kl.*, lxxxv, 429, 1910 (Samoa).

"Samoa," 1 ♀, iii.-viii., 1921 (O'Connor); Upolu : Apia, 1 ♀, 29.v.1924, 2 ♀♀, 8.vi.1924, 1 ♀, 24.x.1924.

Also 2 ♀♀ from Tonga (Vavau, Neiafu), iii.1925.

Meyrick apparently confused two or three species, and, since he did not, in his earlier work, select a holotype, there has been some difficulty in deciding upon the application of his name. The author gives Port Moresby, Tonga, and Fiji as localities, but, as his New Guinea ♂ has the hind tarsus  $\frac{1}{4}$  or less and deviates in some other details, I have made the Tonga ♂ the holotype and believe that the species does not extend westward of the Loyalty Is.; see my notes under *Scopula pseudodoxa* Prout, *Nov. Zool.*, xxvii, 297, 1920. The three specimens in the British Museum from the Solomon Is. (Alu), referred by Mr. Meyrick (*Tr. Ent. Soc. Lond.*, 1889, p. 485, 1889) to *S. homodoxa*, are rubbed examples of *S. oppilata* Walker, with the very characteristic fringes worn off.

### 12. *Scopula*, sp.

*Craspedia*, sp. Rebel, *Denkschr. K. Akad. Wiss. Wien, Math.-Naturw. Kl.*, lxxxv, 429, 1910.

Upolu : Malifa, vi, two specimens, very worn, recorded by Rebel. "Glossy silky-white, one (a ♂) 11 mm., showing traces of red scaling before the vertex."



### Sterrha Hübner.

*Verz. bek. Schm.*, 309, 1826.—*Hyria* Stephens, 1831 (nom. praeocc.).—*Ptychopoda* Stephens, 1831.—*Ania* Stephens, 1831.—*Pythodora* Meyrick, 1886.—*Janarda* Moore, 1888.—*Mnesterodes* Meyrick, 1889.—*Xenocentris* Meyrick, 1889.—*Argia* Gumpfenberg, 1890.—*Andragrupos* Hampson, 1891.—*Lophophleps* Hampson, 1891.—*Carphoxera* Riley, 1891.—*Pelagia* Gumpfenberg, 1892.—*Aphrogeneia* Gumpfenberg, 1892.—*Synomila* Hulst, 1896.—*Ptenopoda* Hulst, 1896.—*Lophosis* Hulst, 1896.—*Hemipogon* Warren, 1897.—*Leptacme* Warren, 1897.—*Strophoptila* Warren, 1897.—*Brachyprota* Warren, 1897.—*Polygraphodes* Warren, 1897.—*Cacorista* Warren, 1899.—*Anteois* Warren, 1900.—*Hyriogona* Warren, 1900.—*Neochrysa* Warren, 1900.—*Pogonogya* Warren, 1900.—*Prospasta* Warren, 1900.—*Thysanotricha* Warren, 1903.—*Deinopygia* Warren, 1904.—*Lobura* Warren, 1906.—*Omopera* Warren, 1906.—*Argyroscelia* Warren, 1907.—*Pareupithec* Warren, 1907.—*Hirtheistes* Dognin, 1914.

Another enormous genus, with a similar distribution to that of *Scopula*. Less strictly homogeneous, showing still wider divergences in shape—sometimes in the ♂ only, sometimes in both sexes—and even in the details of the venation, while the wealth of secondary sexual characters, chiefly in the development and position of hair-tufts or specialised scaling on the wings or legs of the ♂, has given authors an opportunity for the erection of a large number of the “genera” cited in the synonymy above. It is noteworthy that the ♀♀ of some of the very divergent forms are so closely similar *inter se*, not only in structure but in marking, as to be extremely difficult to distinguish.

Speaking generally, the simpler forms belong chiefly to the Palaearctic Region, in particular to the Mediterranean countries. Of the 515 named species known to me (to which must be added, as in the case of *Scopula*, some 50 unworked), 42 belong to the typical, almost exclusively Palaearctic, subgenus *Sterrha*, with a pair of spurs on the ♂ hind tibia; about 240, largely Palaearctic, to the subgenus *Ptychopoda*, with the hind tibial spurs of the ♂ wanting; while the rest have been formed into a number of small and partly somewhat artificial groups, which are almost exclusively exotic. *Andragrupos*, *Hemipogon*, *Strophoptila*, *Thysanotricha*, *Lophophleps*, and *Mnesterodes* belong to the Indo-Australian Region; *Cacorista* to Africa; *Lophosis* and *Ptenopoda* to North America; *Hyriogona*, *Deinopygia*, *Prospasta*, *Pareupithec*, *Lobura*, *Neochrysa*, *Brachyprota*, *Hirtheistes*, *Omopera*, and *Pogonogya* account for most (about 67) of the Neotropical species; *Xenocentris* is distributed, except in Africa, but is predominantly Indo-Australian.

The section *Ptychopoda*, not hitherto known eastward of the Solomon Is., is now represented in Samoa by *S. rufula* Warren. I know of no particularly

likely addition, since the rest of the Indo-Australian representatives of it are mostly Indian or Australian; a very few species are Malayan, and only two or three are known to occur in New Guinea and its satellite islands. Specimens of a member of the section *Hemipogon*—*H. simplex* Warren, 1899 (Lousiade Archipelago)—have recently been received from Dampier I. and New Hanover; this species has very close relatives in *H. lividula* Warren, 1903, of New Guinea, and *H. liparota* Turner, 1908, of Queensland. The type of Warren's *Thysanotricha*—*T. ziczacata* Warren, 1903—is from the Solomon Is. (Isabel I.). That of Meyrick's *Mnesterodes*—*M. trypheropa* Meyrick (New Guinea), = *P. angustipennis* Warren, 1897 (N. Queensland), = *A. ? floccosa* Pagenstecher, 1900 (New Britain)—reaches in one direction to Timor, and I am under the impression that I have seen specimens of it from Fiji; it would not be surprising if it proved to occur in the Samoan group. The somewhat isolated species *S. rhipistis*, on which Meyrick founded his genus *Pythodora*, is at present only known to occur in Fiji.

### 13. *Sterrrha rufula* (Warren).

*Eois* (?) *rufula* Warren, *Nov. Zool.*, vi, 334, 1899 (Solomon Is.: "Tugela" [recte Tulagi, off Isabel I.]).

Upolu: Malololelei, 1 ♀, vii.1925 (Wilder); 1 ♀, 2,000 feet, 24.ii.1924 (P. A. Buxton); 1 ♀, 23.ix.1924; 1 ♀, 21.v.1925; Apia, 1 ♀, 13.ix.1923 (Swezey and Wilder).

Tutuila: Pago Pago, 1 ♀, i., 2 ♀♀, ii.1924 (Steffany).

Also 1 ♀ from S. New Hebrides (Tanna), ix.1925.

*Range*: ? Moluccas (Buru); Kei Is.; British New Guinea; Lousiade Archipelago; St. Matthias; Bismarck Archipelago (New Hanover); Solomon Is. Probably *S. (L.) uniformis* Warren, 1896 (Queensland), and *S. (E.) perspersata* Warren, 1897 (Timor) will also prove to be forms of this insect, in which case the oldest name for the collective species will be *S. uniformis*.

Apparently rather variable. The Samoan form seems rather larger and paler than the Solomons type, and more yellowish than rufous. The New Hebrides example is larger still and sharply marked, but has more typical colouring.

Since this species (besides *S. uniformis* and *S. perspersata*) was described from the ♀, which seems much the commoner sex, it is desirable to add a note on the ♂ structure. Antennal ciliation of ♂ scarcely 1, hind tibia rather long,



strongly thickened distally, tarsus extremely short. No doubt related to the group of *S. (A.) actiosaria* Walker (Ceylon, also widely distributed in India, Malaya, etc.), or may be likened to the larger *S. (S.) carnearia* Warren (*Nov. Zool.*, iv, 63, 1897) (♀, Labuan) = *S. (P.) carneola* Warren (*Nov. Zool.*, iv, 223, 1897) (♂ and ♀ Labuan [loc. typ.] and Penang), which, however, further differs in having the termen of the ♂ hind wing ventricose.

## LARENTIINAE.

A very large subfamily, but chiefly characteristic of temperate and even subarctic climates, the few tropical members of its more typical genera (*Larentia*, *Xanthorhoë*, *Euphyia*, etc.) occurring almost exclusively at high altitudes. The nine genera here recorded from the Samoan Is. are for the most part such as would be expected—*Collix*, *Eupithecia* (in a specialised form), *Chloroclystis* and *Gymnoscelis* with their offshoots, and *Sauris*. The most doubtful as regards its exact generic location is the new species which I assign to *Asthena*.

“*Larentia*” *finitima* Walker (*List Lep. Ins.*, xxiv, 1203, 1862), founded on 4 ♀♀ from the Isle of Pines (Kuni) and provisionally referable to *Xanthorhoë*, sharing to some extent the shape and coloration of the larger Hawaiian *X. leucoxylla* Meyrick; *Scotocyna albinotata legalis* Warren (*Nov. Zool.*, iii, 384, 1896), Loyalty Is.; *Sterrhochaeta chlorodesma* (Meyrick), (*Tr. Ent. Soc. Lond.*, 1886, p. 194) = *Coremia picta* Butler (*Tr. Ent. Soc. Lond.*, 1886, p. 439), Fiji; *Collix subligata* Warren (*Nov. Zool.*, iii, 385, 1896) (? *C. ghosha* Walker, subsp.), Loyalty Is.; the unnamed species treated by Meyrick as the ♀ of *Gymnoscelis erymna* (*vide infra*); *Hybridoneura cristata* (Warren) (*vide infra*, p. 145); *Sauris elaiica* Meyrick (*Tr. Ent. Soc. Lond.*, 1886, p. 193), Fiji; a related species found in the Loyalty Is., recently described as *S. curvicosta* Prout, 1928; *Eois cymatodes* (Meyrick) (*Tr. Ent. Soc. Lond.*, 1886, p. 192), New Hebrides—the foregoing appear to be the only Larentine species yet known to occur in the Pacific islands, apart from those which are here recorded from Samoa.

### *Collix* Guenée.

*Spec. Gén. Léop.*, x, 357, 1858.

A very natural genus, comprising about twenty known species. Of these, one belongs to Africa with Madagascar, and another to Réunion and Mauritius;

the rest are entirely Indo-Australian, mostly inhabiting the islands. *C. ghosha* Walker has a race (*C. sticticata* Warren, *Nov. Zool.*, ix, 361, 1902) in the Solomon Is.; *C. elongata* Warren (*Nov. Zool.*, ix, 360, 1902), and *C. purpurilata* Prout (*Nov. Zool.*, xxxii, 41, 1925) were described from specimens from that group; the Bismarck and Louisiade Archipelagos also provide forms.

#### 14. *Collix lasiospila* (Meyrick).

*Cidaria lasiospila* Meyrick, *Tr. Ent. Soc. Lond.*, 1886, p. 194 (Fiji).

Tutuila: Pago Pago, 1 ♀, 12.viii.1925.

Rather larger than the only Fiji specimen I have seen (a ♀ in the British Museum) otherwise identical; not so large as the ♂ type in coll. T. P. Lucas, according to the measurements given by Meyrick. The determination is only conjectural, since Meyrick does not describe the very distinctive under side, on which the veins are broadly yellow; but I know no other similar Fijian Larentiid to which his description could be applied. Meyrick adds, however, that the same species occurs in Australia, and that there may be some error as regards the locality; but, since there is nothing in his Australian "Revision" (*Proc. Linn. Soc. N. S. Wales*, Series 2, Vol. V, pp. 791-879, 1891) to throw light upon it I cannot pursue the matter further. Similar, though not identical, species do occur in Australia.

#### *Eupithecia* Curtis.

*Brit. Ent.*, ii, 64, 1825.—*Tephroclystia* Hübner, *Verz. bek. Schmett.*, 323, 1826; Meyrick, *Tr. Ent. Soc. Lond.*, 1892, p. 65 (*Tephroclystis*, *ex err.*); Hulst, *Tr. Amer. Ent. Soc.*, xxiii, 265, 1896 (*Tephroclystis*, *ex err.*); Staudinger and Rebel, *Cat. Lep. Palaearct.* (i), 308, 1901; Warren *et al.*, *passim*.

In its more typical forms *Eupithecia*, perhaps the most extensive Geometrid genus in the world, does not concern us here. It occurs almost everywhere in the Palaearctic, Nearctic, Neotropical and Ethiopian Regions, and has a good many representatives in India and perhaps parts of Malaya. But in the Moluccas and New Guinea it seems to be very sparsely represented or almost absent, except for a few specialised offshoots which may claim generic separation. Among the latter is *Mnesiloba* Warren, with double areole, as in the section *Eucymatoge* Hübner, but having in addition a ♂ hind wing specialisation,



in that the tornal region is separated from the rest of the wing and more or less distorted. Besides *E. eupitheciata*, there are two unnamed species, virtually indistinguishable in the ♀ but with different ♂ modifications, both inhabiting New Guinea and the D'Entrecasteaux Is.

### 15. *Eupithecia* (*Mnesiloba*) *eupitheciata* (Walker).

*Phibalapteryx eupitheciata* Walker, *List Lep. Ins.*, xxvi, 1720, 1862 (Australia).

*Eupithecia intentata* Walker, *List. Lep. Ins.*, xxxv, 1676, 1866 (Sarawak).

*Cephalissa delogramma* Meyrick, *Tr. Ent. Soc. Lond.*, 1886, p. 195 (Fiji and Tonga).

*Eupithecia dentifascia* Hampson, *Ill. Hel.*, viii, 117, t. 152, f. 12, 1891 (Nilgiris)

*Chloroclystis intentata* (part.) Hampson, *Faun. Brit. Ind., Moths*, iii, 391, 1895 (Ceylon).

*Eupithecia eupitheciata* Hampson, *Faun. Brit. Ind., Moths*, iii, 398, 1895 (Khasi Hills, Nilgiris, Ceylon, Shan States, Australia, Fiji, Tonga); Prout, *Journ. Bomb. Nat. Hist. Soc.*, xxxi, 319, 1926 (Upper Burma, Java, Sangir, Celebes, New Guinea).

*Mnesiloba eupitheciata* Warren, *Nov. Zool.*, viii, 196, 1901; Turner, *Proc. Roy. Soc. Vict.*, xvi, 237, 1904 (Brisbane).

*Mnesiloba seminigra* Bastelberger, *Ent. Zeit.*, xix, 76, 1905 (Assam).

Upolu: Malololelei, 2 ♀♀, 22, 24.ii.1924; 1 ♀, 2,000 feet, 24.vi.1924; 3 ♀♀, 2,000 feet, 21.iv.1925.

With the exception of the ♀ taken 24.vi.1924, which is fully normal in size, the Upolu examples are rather small. All have the hind wing more or less pale and the subapical shading of the fore wing moderately bright, so that we perhaps have to deal with a local race. But the species is everywhere extremely variable, and so precisely similar is the range of forms exhibited by it that I should hesitate to make any geographical separations in default of very plentiful and very perfect material. The median area of the fore wing is particularly inconstant, and may be darkened either: throughout; only in its posterior part (ab. *seminigra* Bastelberger); in its anterior and distal part, forming a somewhat triangular shade, with its base on the costa and its apex in the angle of the postmedian line about M<sup>1</sup>; at its proximal and distal edges; or it may remain wholly whitish. Two of the Samoan specimens belong to the last-named, the others approximating to the triangularly-marked form, though in varying degree, in no case with the triangle well-defined proximally and posteriorly, nor very completely dark-filled.

I have given the hitherto recorded range under the synonymy, but have also received specimens from Peninsular Siam, Pahang and Sumatra.

*Chloroclystis* Hübner.

*Verz. bek. Schmett.*, 323, 1826.—Meyrick, *Tr. Ent. Soc. Lond.*, 1892, p. 65.—Hampson, *Faun. Brit. Ind., Moths*, iii, 390, 1895.—Turner, *Proc. Roy. Soc. Vict.*, xvi, 228, 1904.—Dietze, *Biol. Eupith.*, 23, 1913.—*Simotricha* Warren, *Nov. Zool.*, iv, 395, 1897.—*Dyserga* Petersen, *Iris* xxii, 281, 1909.

Distinguishable from *Eupithecia* by the subcostal venation of the fore wing, SC<sup>1</sup> running into, or at least anastomosing with C. A large genus, though not nearly so large as *Eupithecia* and characteristic chiefly of the Indo-Australian Region. In the secondary sexual developments it almost rivals *Anisodes*. Assuming that these should be treated as merely subgenera, there are perhaps about two hundred known species; of these only six are Palaearctic and about forty Ethiopian. The few New-World species which have been placed here do not belong to the genus with the exception of *C. elaiachroma* Bastelberger (*Jahrb. Nass. Ver. Nat.*, lxi, 83, 1908 = *E. aquanivaria* E. D. Jones, *Proc. Zool. Soc. Lond.*, 1921, p. 343, t. iii, f. 3), of Bolivia and Brazil, which forms a special section of it.

The name-typical section, with but slightly modified scaling on the ♂ hind wing, contains only the European *C. coronata* Hübner, with races in Japan (*C. lucinda* Butler) and N. W. India (unnamed); its immediate offshoots (*Sesquiptera* Warren, *Gymnopera* Warren = ? *Oligoclystia* Bastelberger, *Chloroplintha* Warren and *Aëtheolepis* Warren) with increased specialisation of that wing, are Indo-Australian, but are not yet known to extend beyond New Guinea. The group with simple ♂ wing-structure (*Calliclystis* Dietze) is distributed throughout the greater part of the range of the genus, and is strongly represented in New Zealand by *Pasiphila* Meyrick (= *Helastiodes* Warren), which is not always structurally distinguishable from it, though very commonly the ♂ antenna bears long fascicles of cilia. To this group (*Calliclystis*) belong, with the possible exception of *C. bosora*, the few Polynesian *Chloroclystis*, all of which are now known to occur in the Samoan Is. One of the groups with tufts on the costal margin of the ♂ (*Bosara* Walker) extends to the Solomon Is. in a form which I suppose to be a race of *C. dilatata* Walker (Borneo) and of which *C. pelopsaria* Walker (Sula) is probably another race. *Thamnocausta* Warren, with specialised oval patches in the ♂ on the hind wing above and on the fore wing beneath, is now known as occurring in the Bismarck Archipelago, specimens of *C. malachitis* Warren (1903) having recently been received at the Tring Museum from New Britain. The rest of the sections need not be noticed here.



16. *Chloroclystis bosora* (Druce).

*Larentia bosora* Druce, *Proc. Zool. Soc. Lond.*, 1888, p. 228, t. xiii, f. 10, 1888 (Fiji).

Upolu: Malololelei, 3 ♀♀, 24.ii., 21, 24.vi.1924; Apia, 1 ♀, 20.v.1922 (Armstrong).

Druce founded his "*Larentia*" *bosora* on a single ♀ and the only other specimen that I have hitherto seen is another ♀ from the same islands. The Samoan examples are rather larger than the type, with rather less white above, and beneath with the reddish flush rather less deep. The character of the markings of the fore wing above, and especially the form of the palpus, which has the second segment smooth-scaled and slightly down-curved, suggest that this is an overgrown relative of *C. admixtaria* Walker, which is known in three races or very close allies: *C. admixtaria* Walker, 1862 (Ceylon; generally distributed in India, the Malay Peninsula, N. Pagi Is., Celebes, and Sambawa); *C. fragilis* Warren, 1899 (Lousiade Archipelago; also in the Kei Is., British New Guinea and perhaps on St. Matthias Is.); *C. bryodes* Turner, 1907 (N. Queensland). The postmedian line of the hind wing, which is weaker and but slightly angled, and the subterminal maculation of both wings are, however, very distinct from the markings of *C. admixtaria*, and the ♂, when discovered, may show higher specialisation.

17. *Chloroclystis mempta*, sp. n.

♂♀, 13–15 mm. Head, body, and wings predominantly drab, variable in tone, the pale ground-colour being more or less tinged with olive, the dark markings more cinnamon-brownish or fuscous. Face darker above and below than in middle; no definite cone. Palpus  $1\frac{3}{4}$  to 2, second segment rough-scaled above and beneath; first and second segments beneath sprinkled with fuscous. Vertex rather pale. Antennal scales at ends of segments rather dark, slightly projecting; ciliation in ♂ scarcely  $\frac{1}{2}$ . Abdomen, except third and fourth somites, with unequal dark belts; body beneath pale, in places almost white; ♀ robust. Hind tibia with the inner spurs long, especially the proximal one; the outer short.

*Fore wing* rather short; apex moderately rounded; SC<sup>1</sup> running into C; markings rather variable; basal and subbasal tending to form ill-defined narrow bands; antemedian line at or slightly before  $\frac{1}{3}$ , a little out-bent in middle; postmedian from a rather strong dot at  $\frac{1}{2}$  costa, excurved in anterior part, then

at least as oblique as termen, scarcely incurved; median area traversed by ill-defined lines or—in the ♂ and 1 ♀—with more or less dark shading proximally and distally, converging into a more definite dark spot from  $M^2$  to hind margin; lines beyond more or less parallel, with the proximal subterminal fairly strong, band-like, an indistinct pale longitudinal mark behind  $R^3$ ; a slight cloudy submacular terminal band; terminal line little darker, interrupted by pale dots at the veins. *Hind wing* with termen faintly sinuous between the radials, and more markedly between  $M^1$  and  $SM^2$ ; concolorous with fore wing, but looking slightly paler on account of a widening or accentuation of the pale band outside the postmedian; postmedian a little angled about  $R^3$ ; longitudinal pale spot of outer area not or scarcely developed.

Under side paler, more glossy; the only noticeable markings a cloudy postmedian, arising on the fore wing from a costal spot, and on the fore wing an antemedian costal spot (generally weaker).

Upolu: Malololelei, type ♂ and the most similar ♀ (allotype), 2,000 feet, 21.iv.1925; a more cinnamon-tinged ♀, 1.vi.1924; a greyer, more regularly lined ♀, slightly reminiscent of *Gymnoscelis fasciata* Hampson, 25.ii.1924. This species may be placed next to *C. sordida* Warren (1903), which is distributed in New Guinea and its islands and I believe reaches the Solomon and Bismarck groups, while it is probably only a subspecies of (identical with?) *C. inops* Warren (1898, erroneously as *Gymnoscelis*), of the Kei Is. and Amboina. These latter, however, have both the proximal spurs of the hind tibia short, while *C. pauxillula* Turner (1907), of N. Queensland, likewise closely similar in shape and facies, has the ♂ hind wing hairy beneath (sect. *Dasymatia* Warren).

A figure of this species, in colour, will appear in Part III, Fascicle 4.

### 18. *Chloroclystis lepta* (Meyrick).

*Pasiphila lepta* Meyrick, *Tr. Ent. Soc. Lond.*, 1886, p. 191, 1886 (Tonga and Marshall Islands).  
? *Pasiphilodes lepta* Warren, *Nov. Zool.*, ii, 110, 1895.

Tutuila: Pago Pago, 1 ♀, i.1924 (Steffany).

Apparently variable, but only four specimens, all from different islands, are yet known to me, so that it is not at present possible to form an opinion on the nature of the variation. A ♀ in the British Museum, from Moorea, Society Is., is strongly marked above and agrees pretty closely with the present example. Meyrick's original from the Marshall Is. is a little paler, that from



Tonga paler still. The under side is always weakly marked. The originals were both marked by their author "cotype," but Sir George Hampson has made the ♂, from the Marshall Is., the holotype.

### Micrulia Warren.

*Nov. Zool.*, iii, 396, 1896.

This genus differs from the two previous genera in that the hind tibia in both sexes has only three spurs, the proximal one very long. The characters upon which Warren bases his genus are: hind wing of the ♂ triangular, with termen nearly straight, abdominal margin puckered above and bearing beneath, from anal angle to M, tufts of thick hair. He adds that it is otherwise as *Chloroclystis*; but, besides the tibial character, it differs in having SC<sup>1</sup> of the fore wing parallel with C and closely approximated, but not anastomosing. Only the type species entirely agrees with this characterisation, but I consider *Opistheploce* Warren, with termen of hind wing in ♂ "convolute and folded over above," to be merely a section of *Micrulia*, and would refer to *Opistheploce* the following: *M. cinerea* Warren (1896) (Batjan, only the type known); *M. rufula* Warren (1899) (praec. form. ?) (Milne Bay; also found from Dutch New Guinea to Choiseul); *M. eurentosoma* Hampson (1903) (sequ. ♀ ?) (Ceylon); *M. mediopлага* Swinhoe (1902) (Borneo; also occurs in Ceylon).

### 19. *Micrulia tenuilinea* Warren.

*Micrulia tenuilinea* Warren, *Nov. Zool.*, iii, 391, 1896 (Khasi Hills).

*Megatheca dentosa* Warren, *Nov. Zool.*, viii, 31, 1901 (Queensland).

*Gymnoscelis lobata* ♀ Hampson, *Journ. Bomb. Nat. Hist. Soc.*, xxi, 1246, 1912 (*ex err., nec* ♂) (Ceylon).

Upolu: Malololelei, 2,000 feet, 1 ♂, 25.ii.1924.

Like several of the small and obscure Eupitheciids, this species must have an enormously wide distribution, but has been much overlooked. I had seen specimens of it from Ceylon, Assam, the Malay Peninsula and Pulo Laut and had confidently labelled the "Queensland" example in Tring Museum, with the facies and setting of the specimens in the same collection from the Khasi Hills, as "err. loc. (probably Khasis)." In view, however, of the astonishing discovery of it on Upolu, I must revise that judgment. Turner (*Proc. Roy. Soc. Vict.*, xvi, 281-2, 1904) does not know Australian material. F. Wood Jones

(*Corals and Atolls*, p. 354, 1910) records, "*Chloroclystis tenuilinea* Warren" from Cocos Keeling Is., not uncommon in June and August, the larva green, with darker markings, and slightly hairy, feeding on the sticky flowers of *Pisonia* and pupating among them. But I suspect this is an error of determination; the only *Chloroclystis* I have seen from that locality (1 ♀ in Mus. Brit., 3 ♀♀ in Mus. Tring) is a remarkably *lepta*-like species.

### Gymnoscelis Mabilie.

*Ann. Soc. Ent. Fr.*, (4), vii, 656, 1867.—Meyrick, *Tr. Ent. Soc. Lond.*, 1892, p. 65, 1892.—Hampson, *Faun. Brit. Ind., Moths*, iii, 388, 1895.—Turner, *Proc. Roy. Soc. Vict.*, xvi, 224, 1904.—Dietze, *Biol. Eupith.*, 15, 1913.—*Dolerosceles* Meyrick, *Tr. Ent. Soc. Lond.*, 1889, p. 480, 1889.

Differs from *Chloroclystis* in the absence of the proximal spurs of the hind tibia. A small intermediate genus, *Calluga* Moore = *Sillophora* Warren, with a single proximal spur (SC<sup>1</sup> of fore wing as in *Chloroclystis*) and divisible on ♂ characters into several sections, may prove to be represented in Polynesia by a race, or races, of *C. costalis* Moore, which is already known to be represented in New Guinea by *C. (S.) albiviridis* Warren (1907), and in Queensland by *G. cissocosma* Turner (1904); or of *Calluga (Megatheca) catocalaria* Snellen (1881, Celebes) = *C. purpurea* Warren (1897, Penang) = *C. lobata* ♂ Hampson (1912, Ceylon), which is scattered over the islands of Malaya and Melanesia.

Of *Gymnoscelis* about sixty species are known, but the number is likely to be greatly increased when they have been more thoroughly studied, since the majority are small and obscure; and often confusingly alike. On the other hand, some of them clearly have a very wide distribution. Of the known about five species are Palaearctic, and some ten are African, the rest Indo-Australian, with a rather high percentage in Queensland—probably because the Australian *Geometridae* are being carefully studied by a competent entomologist, Dr. A. J. Turner, while in many other parts of the region the small species are almost entirely neglected.

Specialised ♂ sections are rarer and less striking in this genus than in the preceding genera. Perhaps the most striking is *Iramba* Moore, with its curiously tufted middle and hind tibiae. This is represented in India and Malaya by the type species *G. tibialis* Moore, and in Australia by *G. lophopus* Turner (1904) = *G. homogona* Turner (1907), and may be expected to occur in many other parts of the region.



20. *Gymnoscelis erymna* (Meyrick).

*Eupithecia erymna* ♂ Meyrick, *Tr. Ent. Soc. Lond.*, 1889, p. 192, 1886 (Tonga).

? ? *Dolerosceles erymna* Meyrick, *Tr. Ent. Soc. Lond.*, 1889, p. 480, 1889 (British New Guinea).

*Gymnoscelis erymna* (part.) Meyrick, *Proc. Linn. Soc. N. S. Wales*, (2), v, 794, 1891 (Tonga).

*Gymnoscelis concinna* Swinhoe, *Tr. Ent. Soc. Lond.*, 1902, p. 651, 1902 (Tonga).

? *Gymnoscelis semipurpurea* Rebel, 2 *Beih. Jahrb. Hamb. Wiss. Anst.*, xxxii, 150, 1915 (Samoa).

Upolu : Apia, 1 ♀, v.1896 (P. de la Garde) ; 1 ♀, 13.ix.1923 (Swezey and Wilder) ; 2 ♀♀, 24.v.1924 ; 1 ♀, 30.v.1924 ; 1 ♀, x.1925 ; Malololelei, 2 ♂♂, 1 ♀, 22.ii.1924 ; 1 ♂, 24.ii.1924 ; 1 ♂, 6 ♀♀, 2,000 feet, 25.ii.1924.

Tutuila : Pago Pago, 1 ♂, v.1896 (P. de la Garde).

Besides specimens from Tonga and Samoa, the British Museum has a single example from Pitcairn Is. Other localities from which the present species has been recorded are either very doubtful or positively erroneous—*cf.* Meyrick, *Proc. Linn. Soc. N. S. Wales*, (2), v, 794, 1891, *Proc. Roy. Soc. Vict.*, xvi, 225–6, 1904, and *Proc. Linn. Soc. N. S. Wales*, xxxi, 684, 1906.

Meyrick's supposed "♀ type" (allotype) belongs to a different species, having SC<sup>1</sup> of the fore wing running into C, the hind wing emarginate between the radials, the postmedian line of both wings angled at R<sup>1</sup> instead of R<sup>3</sup>, etc. The ♂ holotype is unfortunately worn, and it is no doubt the dissimilarity between the spurious allotype and the two beautiful ♀♀, which were subsequently received, that misled Swinhoe into erecting a new species (*G. concinna*) for the latter. In the true *G. erymna* = *G. concinna* as Meyrick rightly indicates, SC<sup>1</sup> of the fore wing does not touch C ; at least this is, without exception, the case in over twenty examples examined by me, although in one Malololelei ♀ the approach is so close that an occasional aberration with slight anastomosis would not be an impossible development.

In view of the confusion that has arisen over this species, which is shown by the Samoan series to be decidedly variable, I give some further description.

Frontal cone rather sharp. Palpus 1½ or scarcely over, second segment with a small dark tuft beneath at its distal end, third segment short to medium, distinct, rather robust, somewhat deflexed and appearing more so on account of the longitudinal curvature of its upper side. Antennal ciliation of ♂ 1, of ♀ ½. Abdomen of ♂ elongate. Fore wing elongate, with costa straight except at base and near apex ; antemedian double, generally with the interspace dark-

filled; postmedian wavy, especially anteriorly, slightly oblique outward and generally thickened (especially between the radials) from costa to  $R^3$ , here with a pronounced, though generally rather rounded elbow, posteriorly more punctiform, about parallel with termen; distal area always with a very noticeable, though not sharply defined, pale longitudinal streak about the middle, more or less completely interrupting the subterminal markings and sometimes almost reaching the termen. Hind wing with termen strongly convex, almost regularly curved from apex to near tornus, only behind  $M^2$  straighter or very faintly incurved;  $SC^2$  stalked, but generally shortly, not rarely (at least in the ♀) almost connate; postmedian line strong, generally thickened, with proximal black vein-dashes, a more or less V-shaped indentation between the radials, generally produced proximad by a longer black dash which converts it into a Y, a rather variable angle outward at  $R^3$ ; pale subterminal mark weaker than on fore wing, shorter (macular), not rarely more or less obsolete. Under side weakly marked.

Most of the Samoan series are darker, or at least more brownish, than the pale greenish-grey *G. concinna*, from which one gets the best conception of the Tonga form, so far as at present known; but one Malololelei ♀ approaches that form quite closely. One ♂ has the wings much clouded, especially in the median area of the fore wing (unfortunately discoloured at the base). A ♀ has the median area of the fore wing and the narrow band beyond almost clear white, confluent with the distal pale streak, which is also whitened, while the rest of the terminal area, together with the basal, is dark; the hind wing dark, with narrow white band outside the postmedian and small whitish mid-subterminal spot. The only ♂, taken 25.ii.1924, is small, attenuated and pale, but not in perfect condition.

*G. semipurpurea* Rebel was founded on 2 ♀♀ sent by Friedrichs, hence probably from Apia, although only "Samoa" is given. Notwithstanding the close agreement of Rebel's description with one of Buxton's Upolu forms, I have felt constrained to add a query to the citation because its eminent and experienced author has definitely differentiated his *G. semipurpurea* from *G. upolensis* ♀ by the "non-dentate" condition of the antenna. In the present species—as in nearly all the allied *Gymnoscelis* material that I can examine—the segments in both sexes bear at their distal ends bands of more or less projecting scales, giving to the proximal part of the antenna a vague suggestion of an *Equisetum*, but tending progressively to project at a steeper angle distally,



so as to suggest under a hand-lens pronounced teeth. But inasmuch as these scales (which are dark and conspicuous in several of the species, including *G. lepta*) can be more appressed, or may become abraded, much caution is needed in judging of the exact conditions.

## 21. *Gymnoscelis upolensis* Rebel.

2 *Beiheft Jahrb. Hamb. Wiss. Anst.*, xxxii, 131, 1915 (Upolu : Apia).

Rebel founded this species on a pair of specimens taken at light by Dr. K. Friedrichs, the ♂ with a fore wing length of 8 mm., the palpus short, the abdomen very long, the ♀ smaller (a fore wing 6 mm.), with palpus twice as long ; “ antenna in both sexes finely dentate.” The postmedian line of the fore wing has its principal angle near the costa instead of—as in *G. lepta*—in the middle of the wing ; Rebel places the angle “ at vein 7,” but I suppose its precise point to be between 7 and 6 ( = SC<sup>5</sup> and R<sup>1</sup>), as in the specimen which I am referring to this species, as well as in the group generally (*G. imparatilis* Walker, etc.).

A ♀ with the fore wing almost 8 mm. in length and with a more reddish suffusion than in Rebel's types, much as in the reddish and not very variegated forms of *G. pumilata* Hübner, was taken by Buxton at Apia, 29.i.1924, and may with a fair degree of probability be assigned to *G. upolensis*. I think that the same species, in a more brownish form and with a rather heavy postmedian line, occurs in the Marquesas Is. (Nuka Hiva, 2 ♂♂, 2 ♀♀, in Mus. Brit. ; “ 300 feet,” 1 ♀, C. L. Collenette, “ St. George ” Expedition), and I doubt whether it will prove more than a form of the species which I call *G. imparatilis* Walker (1865) ; the latter is probably very variable and has been described under many different names, although it is quite possible that at present two or more species are confused together. A few years ago I provisionally separated :

(1) *G. imparatilis* Walker, 1865 (Sarawak) = *G. subtristigera* Walker, 1866 (Sarawak) = (ab.) *G. perangusta* Warren, 1897 (Sarawak). Wings of the ♂ very narrow, in the type—but not in the other cited forms—reddish beneath. Distal area without prominent white admixture. Penang ; Borneo ; ? Moluccas.

(2a) *G. indicata indicata* Walker, 1866 (Sarawak) = *G. confusata* Walker, 1866 (Sarawak) = (ab.) *G. semivinosa* Warren, 1896 (Java) = ? (ab.) *G. semialbida* Walker, 1866 (Borneo). Wings of ♂ rather less narrow. Distal area of hind wing usually with much admixture of white in posterior half. Ceylon ; India ; Malaya ; Java ; Borneo ; Formosa.

(2b) *G. indicata grisea* Warren, 1897 (Fergusson) = *G. aenictopa* Turner, 1907 (Queensland). Whitish admixture in distal areas generally less manifest, more central (*nom. vix conservandum*?). ? Sambawa; ? Kei Is.; ? Dammer I.; New Guinea; D'Entrecasteaux Is., Louisiade Archipelago; Bismarck Archipelago; Solomon Is.; Queensland.

Unfortunately much of the available material, including some of Walker's types, is in very poor condition, and some of the names are based on ♀♀. The present notes are only offered as a possible basis for further research. Structurally the group differs from *G. lepta* in the anastomosis of SC<sup>1</sup> with C. The specimen of *G. "upolensis"* before me resembles *G. imparatilis* rather than *G. indicata*, but on geographical grounds—if there be two species—it more probably represents a race of the latter.

## 22. *Gymnoscelis refusaria* (Walker).

*Acidalia refusaria* Walker, *List Lep. Ins.*, xxiii, 767, 1861 (Sarawak).

*Chloroclystis minima* Warren, *Nov. Zool.*, iv, 227, 1897 (N. Queensland).

*Pasiphilodes maculilinea* Warren, *Nov. Zool.*, v, 429, 1898 (Kei Islands).

*Gymnoscelis refusaria* Swinhoe, *Cat. Lep. Het. Oxf. Mus.*, ii, 350, 1900.

Upolu: Malololelei, 1 ♀, 23.ii.1924.

The specimen is not very fresh, but seems evidently referable to this distinct and not particularly variable species, which is rather short-winged in comparison with its congeners, paler than usual, and has the markings weak except for a few strong spots.

New for Polynesia, but the previously known range is very wide: Ceylon; Borneo; Kei Is.; New Guinea (Goodenough Bay); Rossel I.; Bismarck Archipelago (Rook I. and New Hanover); N. Queensland. *G. refusaria* appears to be predominantly an island species, but—like most of its congeners—is no doubt much overlooked.

## *Pseudomimetis*, gen. n.

Face with small cone below. Palpus moderate, second segment distally with projecting scales above and beneath, third segment moderately strong. Tongue developed. Antenna in ♂ simply ciliated. Hind tibia with two rather unequal spurs. Abdominal crests slight. Fore wing without areole, SC<sup>1</sup>–SC<sup>5</sup> stalked, SC<sup>1</sup> arising opposite or slightly before (very rarely just after) SC<sup>5</sup>, anastomosing with C, R<sup>1</sup> separate, M<sup>1</sup> separate. Hind wing in ♂ not contorted;



C anastomosing with SC to near end of cell, SC<sup>2</sup> stalked with R<sup>1</sup> in ♀, coincident in ♂, M<sup>1</sup> connate or just separate.

Genotype: *Pseudomimetus semiviridis* (Warren) = *Gymnoscelis coquina* ab. *semiviridis* Warren, 1897.

Differs from *Hybridoneura* Warren in having the ♂ antenna not dentate-fasciculate, in the less long stalking of SC<sup>1</sup>, in the hind wing of the ♂ not being distorted, but with SC<sup>2</sup> coincident, the wings of the ♀ not unusually broad, M<sup>1</sup> of the hind wing not stalked.

The few Larentiids of the *Chloroclystis* group which have the areole suppressed (or vestigial \*), leaving all five subcostals of the fore wing to arise from a common stalk, can be referred to four genera, distinguishable as follows:

- |  |                        |
|--|------------------------|
| 1. Hind tibia with 3 spurs, SC <sup>1</sup> of fore wing free . . . . .                                | 2                      |
| Hind tibia with 2 spurs, SC <sup>1</sup> of fore wing anastomosing with C . . . . .                    | 3                      |
| 2. Hind wing of ♂ much distorted, costally with large brush of hair . . . . .                          | <i>Mariaba</i> .       |
| Hind wing of ♂ nearly amygdaloid, not distorted, above with a roundish sex-patch beyond cell . . . . . | <i>Onagrodes</i> .     |
| 3. Hind wing of ♂ triangular, wings of ♀ very broad . . . . .  | <i>Hybridoneura</i> .  |
| Wings normally shaped . . . . .  | <i>Pseudomimetus</i> . |

*Onagrodes* contains two known species, and probably also a third (found in S.-W. Sumatra), of which the ♂ has yet to be discovered. Though closely related, the two former species differ in the exact position of the sex-patches of the ♂, that of the hind wing being placed between SC<sup>2</sup> and R<sup>1</sup>, near their origin, in the Indian species and at the base of the radials in the Papuan. The former, *O. obscurata* Warren (1896), is only known as occurring in the Khasi Hills; the latter, *O. recurva* Warren (1907) (♂) = ? *O. viridis* Warren (♀) was described from a specimen from New Guinea (Owen Stanley Range), but is also known to occur in both forms in the Bismarck Archipelago. In the present genus, the structure of the scent-patch shows a rather close resemblance to that of *Melitulius* Meyrick.

To *Mariaba* Walker (= *Adeta* Warren) belong also, if my suggested synonymy is correct, only two known species, both with a wide distribution, though not as yet found in Polynesia: (1) *M. convoluta* Walker (1866, Sarawak) = ? *M. ampla* Warren (1899, Lombok); additional known localities for the collective species are Assam to Malay Peninsula, and Dutch New Guinea.

\* The latter is the case in several ♂♂ and at least one ♀ of *Hybridoneura*, including the type specimen of the genotype *H. abnormis* Warren, though overlooked by its describer.

(2) *C. semifascia* Warren (1903, British New Guinea); additional localities for the collective species are the Sula Is., New Britain, and the Solomon Is. Both species will probably be separable into races, but are still very sparsely represented in collections, and are further complicated by the extreme sexual dimorphism. It may be added that "*Mariaba*" *medioplaga* Swinhoe (1902) is a *Micrulia* (*Opistheplocce*), *vide supra*; "*Adeta*" *confusa* Warren (1906), probably a *Hybridoneura* ♀, while "*Adeta*" *viridis* Warren (1907) is, I suspect, the ♀ of *Onagrodes recurva* Warren (1907).

*Hybridoneura* Warren and *Symmimetis* Turner (= *Neoscelis* Hampson, 1903, *nec* Schock, 1897) must evidently be sexes of a single genus, though this does not appear to have been suspected heretofore. The known specimens of *Symmimetis* (*sens. str.*) and *Neoscelis* are invariably ♀, and the pattern of their under sides shows a good deal in common with that of examples of *Hybridoneura*, which are always ♂. *H. abnormis* Warren (1898) was found in the Khasi Hills, and *N. cristata* Warren (1897) = *N. rivula* Hampson (1903) has also been taken there. A ♂ closely similar to *H. abnormis* was captured with *N. metachlora* Hampson (1907) at Haputale, Ceylon. An undescribed *Hybridoneura*, apparently representing a race of *H. abnormis*, was collected in the Hydrographer Mountains, British New Guinea, with what appears to be *N. cristata*. The ♀ forms which have passed, comprehensively, as "*Neoscelis*" *cristata*, and really vary very little, have an extremely wide range: Ceylon, N. India, the Andaman Is., Penang, Bali, Dutch and British New Guinea, Rossel I., Feni I. (off New Ireland), the Solomon Is. (Bougainville I.), and ? Fiji (only a worn example yet seen from the last-named locality). From Turner's description of his *N. muscosa*, moreover—the type of the genus *Symmimetis* (1907)—I have no doubt that Queensland must also be added, though I have not yet seen an Australian example.

### 23. *Pseudomimetis semiviridis* (Warren).

*Gymnoscelis coquina* ab. *semiviridis* Warren, *Nov. Zool.*, iv, 228, 1897 (Queensland).

*Gymnoscelis picta* Warren, *Nov. Zool.*, viii, 30, 1901 (Khasi Hills [err. loc. ?]).

*Symmimetis sylvatica* Turner, *Tr. Roy. Soc. S. Austral.*, xlvi, 234, 1923 (N. Queensland).

Upolu: Vailima, 600 feet, 1 ♀, 1.ii.1924.

There may possibly be some geographical variation in this species, of which few examples are yet known, but there can be no doubt concerning their essential homogeneity. Except for the unique "Khasi" type of *G. picta*, I had only seen



specimens from Woodlark and Rossel Islands and N. Australia, and it is therefore justifiable to question the origin of the type in question. But, in view of the range of such species as *Micrulia tenuilinea* (*supra*), I cannot reject it utterly, especially considering the high degree of accuracy shown in the labelling of specimens in the Tring Museum. The Woodlark and Rossel ♀♀ have the blackish patch on the end of the abdomen above rather more extended than in those from Queensland and Samoa. Both forms vary in the depth of the ochreous suffusion of the hind wing.

Warren's *Gymnoscelis semiviridis* was extremely badly described, and the species has not the remotest connection with *G. coquina*; but since the author in question expressed a suspicion that it might prove to be a distinct species, his name must be regarded as valid.

### Ziridava Walker.

List Lep. Ins., xxvi, 1550, 1862.—Hampson, *Faun. Brit. Ind., Moths*, iii, 391, 1895 (*Chloroclystis* sect. *Liridava* [*sic*]).—Swinhoe, *Ann. Mag. Nat. Hist.*, (6), xvi, 295, 1895 (*Xiridava* [*sic*]).

This genus has, perhaps with justice, been merged by some systematists, in *Chloroclystis*, but seems to be a collateral development. Face with long and sharp cone. First segment of palpus with strong scale-tuft beneath, second segment with strong downcurved scale-tuft distally beneath. Wings elongate, coloration not green, SC<sup>1</sup> anastomosing with C, but without the pronounced tendency to remain coincident with it thereafter.

Two sections, according to the ♂ antenna, have hitherto been known.

A. Antenna of ♂ pectinate: *Z. rufinigra* Swinhoe (1895, Khasi Hills), with a race *brevicellula* Prout (1916, D'Entrecasteaux Is.; also known to occur in New Guinea), and a second race, at present unnamed (N. Queensland).

B. (Sect. typ.). Antenna of ♂ dentate-fasciculate: *Z. xylinaria* Walker (1862, Sarawak; also found in N. India, Malaya, Java, ? Bali), with provisional races *subrubida* Warren (1897, Celebes), *leptomita* Turner (1907, N. Queensland; also known to occur in New Guinea, D'Entrecasteaux Is., Louisiade and Bismarck Archipelagos, and the Solomon Is.; possibly susceptible of further subdivisions), and perhaps a fourth race (? sp. div.) found in Flores.

To these must now be added Sect. C, with ♂ antenna simple, for the reception of the following species.

24. *Ziridava dysorga*, sp. n.

♂, 25 mm. Head and body concolorous with wings. Palpus  $2\frac{1}{4}$ , first and second segments mixed with blackish beneath. Hind tibia with the spurs not extremely unequal. Abdomen less slender than in the ♂ of the genotype; first somite (with extremity of thorax) black above; further irregular brown belts; crests well developed, tipped behind with black.

*Fore wing* with  $SC^1$  anastomosing only shortly with C; light pinkish cinnamon, with deeper shadings—along the costa more vinaceous, partly (especially in the cell posteriorly) bright ochraceous buff; cell-dot minute, grey; lines in part very weak and slender; antemedian double, oblique, slightly interrupted, enclosing a narrow, glistening, grey band (in some lights vinaceous-tinged); postmedian similar, rather less definite, slightly more oblique, retracted and (especially proximally) ill-defined costally, marked at hind margin by a dark spot and between the radials by a heavy blackish patch; subterminal obsolescent, but with twin blackish spots between the radials; terminal spots evanescent; fringe somewhat olivaceous. *Hind wing* with termen waved;  $SC^2$  quite shortly stalked; proximal area rather pale, with very fine lines; postmedian lines obsolete anteriorly, from  $R^1$  to abdominal margin almost straight, entirely filled in with blackish; outer lines very indefinite, the subterminal developing dark interneural dots, of which the posterior three are the stronger.

Under side with the markings more weakly reproduced.

♀, 28 mm.  $SC^1$  of fore wing anastomosing moderately with C. Paler, nearly the colour of *Asthena eurychora*, the blackish markings of abdomen and postmedian wanting, those of subterminal greatly weakened, indicated in brownish.

Upolu: Malololelei, 2,000 feet, type ♂, 21.iv.1925; allotype ♀, 2.vii.1924 (Armstrong).

A figure of this species, in colour, will appear in Part III, Fascicle 4.

## Sauris Guenée.

A moderately large Indo-Australian genus, consisting of about seventy or eighty known species, of which several are not yet described. The present genus is of great interest on account of the multiplicity of the secondary sexual divergences in the ♂, although pride of place in this respect must be accorded to the genera *Anisodes* and *Sterrha*, discussed above. In *Sauris* and the nearly



world-wide group to which it belongs, the modifications are chiefly in the ♂ hind wing, which is often extremely narrowed and contorted, its posterior part commonly cut or folded into simple or composite lobes or pockets. The Holarctic genera (*Lobophora* group) are in the main the least extremely specialised, and have the palpi normal. In *Sauris* the latter are more often abnormally long, as is frequently the case in the endemic *Tatosoma* of New Zealand, which differs from *Sauris* in having three spurs on the hind tibia and the areole double, whereas in *Sauris* the ♂ hind tibia is spurless, while the ♀ has two spurs on its hind tibia and a simple areole. *Rhopalodes*, of Tropical America, has the areole double and all spurs present, but is remarkable in having clubbed antennae. The Chilian representatives of the group (*Tomopteryx*, *Lagynopteryx*, *Hoplosauris* and several others) show great diversity of structure, including some of the most extreme reductions of the hind wing, but hitherto have not received much in the way of detailed study.

In a first rough analysis of *Sauris* I have recognised thirteen structure-groups, which include the following "genera" of Guenée and Warren: *Dystypoptila* Warren, *Holorista* Warren, *Pseudoschista* Warren, *Helminthoceras* Warren, *Remodes* Guenée, *Anthierax* (Warren, *Nov. Zool.*, xii, 11, 1905, in descr.), *Coptogonia* Warren, and *Anisocolpia* Warren. Possibly one or two of these may prove generically tenable, but the majority are clearly shape-sections of an indivisible entity. It is noteworthy that the ♀ hind wing shows three types of venation, which may have some phyletic significance: (1)  $R^3-M^1$  connate or just separate (*S. lichenias* Meyrick, 1891, only 1 ♀ known to me); (2)  $R^3-M^1$  stalked (the great majority); (3)  $R^3-M^1$  coincident (*S. hirudinata* Guenée, 1858, *S. muscosa* Rothschild, 1915 [*hirudinata* subsp. ?] and *S. angusta* Warren, 1905).

*S. elaica* Meyrick and its Lifu relative (*vide supra*, p. 132) probably belong to the section which is typified by *S. remodesaria* Walker (1862—*Remodes* auctt., *nec* Guenée), and have, in addition to the contorted hind wing, a more or less deep cleft in the termen of the fore wing between the median veins, and tufts of specialised scales and of hair on the tornal lobe thus formed. This section contains also the following, besides a few species and races at present undescribed: *S. melanoceros* Meyrick, 1889, British New Guinea; *S. vetustata* Walker, 1866, Australia [Queensland]; *S. auricula* Warren, 1895, Perak; *S. parviplaga* Warren, 1906, New Guinea; *S. cirrhigera* Warren, 1897 = *S. nusta* Swinhoe, 1902, New Guinea and eastward as far as the Bismarck Archipelago, perhaps

also on Ceram I. and Waigeu I. (Warren's type was from Woodlark I.); *S. subnigrata* Warren, 1905, Solomon Is. (praec. subsp. ?). Whether the new species about to be described also belongs here must be settled when the ♂ is discovered, but I think it probable. No other section of *Sauris* need yet be specially considered in relation to the Polynesian fauna; the section *Sauris* only reaches the Solomon Is. (*S. abnormis nitidula* Warren, 1899 and *S. angusta* Warren, 1905), *Holorista* New Guinea, *Pseudoschista* the Solomon Is. (*P. dentatilinea* Warren, 1905, and a few unnamed forms), *Helminthoceras* Woodlark I. (*H. erigens* Prout, 1925), *Anthicrax* the Solomon Is. (*A. subfulva* Warren, 1905), *Coptogonia* the Bismarck Archipelago (*C. lucens fortunata* Prout, 1925); *C. volcanica* Butler, 1887 (= *C. erebata* Warren, 1903) belongs to the Solomon Is., *C. aspricosta* Prout, 1925, to New Ireland, and *C. brunnescens* Warren, 1896, to British New Guinea, Fergusson I. (loc. typ.) and the Solomon Is.

## 25. *Sauris mellita*, sp. n.

♀, 33-36 mm. Head and body buff. Palpus very long (nearly 4), terminal segment long, not extremely slender; tinged above with olive. Legs in part clouded with grey.

*Fore wing* with areole large, SC<sup>1</sup> from before its end, SC<sup>5</sup> just stalked with SC<sup>2-4</sup>, R<sup>1</sup> about connate, R<sup>2</sup> slightly before middle of DC; base mixed with buff (perhaps discoloured in the type); the rest whitish-green, with rather thick wavy lines of deep grape green, about eleven more or less well expressed, one or two others faintly indicated; the lines of the median area in part marked with dusky brown, especially behind M and its branches, culminating in rather strong spots at SM<sup>2</sup>; this area twice as broad at costa as at hind margin; the three postmedian lines (especially the outermost) rather markedly indented inward at SC<sup>5</sup> and outward at R<sup>1</sup>, the second and third coalescing behind middle; the bisected band beyond rather more mixed with white, especially distally; the first and second lines of distal area marked with dusky brown between the radials and just behind M<sup>2</sup>; the line outside the pale subterminal indented in cellule 7, with some dark scales at the point of the tooth; termen with six large dark dots (on veins SC<sup>5</sup> to M<sup>2</sup>), a smaller dot at apex and at SM<sup>2</sup>; fringe pale. *Hind wing* with C anastomosing with SC nearly to end of cell, SC<sup>2</sup> with R<sup>1</sup> and R<sup>3</sup> with M<sup>1</sup> variably stalked, R<sup>2</sup> from about centre of DC; cream-buff to chamois; distal half of fringe more whitish.



Under side coloured nearly as hind wing above, the fore wing more tinged with honey-yellow.

Upolu : Malololelei, 2,000 feet, type 5.vii., paratype 14.vii.1924.

I scarcely think this can be a race of *S. elaiica* Meyrick, of which the type ♀ is worn, the hind wing apparently grey, not buff, while the fore wing has heavier black-brown markings.

A figure of this species, in colour, will appear in Part III, Fascicle 4.

### *Asthena* Hübner.

A rather small genus, consisting, as at present restricted, of only twenty-two species, although some related groups—*Bihastina* Prout, with dentate and excavated distal margins, *Minoa* Treitschke, with rather different venation and different habitus and ecology, and *Laciniodes*, with heavier palpus—might well be treated as subgenera. Of the number mentioned, sixteen species are Palaearctic, Chinese, or Himalayan, and there is consequently some room for doubt whether the remaining six have any really near connection with them ; of these six, five inhabit New Guinea, while *A. euthecta* Turner (1904) occurs in Queensland and Victoria.

The genotype, *A. albulata* Hufnagel (= *A. candidata* Schiffermüller) is rather abnormal, having the cell of the fore wing nearly  $\frac{1}{2}$ , the areoles generally both small, with all the five subcostals stalked well beyond them ; and Turner, in proposing (*Tr. Roy. Soc. S. Austral.*, xlii, 233, 1922) to remove his *A. euthecta* to *Minoa*, would also remove nearly all the other *Asthena*, including even *A. anseraria* Herrich-Schäffer, *A. nymphaeata* Staudinger and *A. lassa* Prout (1926), which, indeed, not only have (like *A. euthecta*) normally developed areoles, with SC<sup>1</sup> arising from the anterior margin of the distal one, but further differ venationally from *A. albulata* in that the cell is  $\frac{2}{5}$  or scarcely longer. On the other hand, another abnormal and rather discordant species ("*Autallacta*" *livida* Warren, 1896) could remain with *A. albulata* in so far as regards the stalking of the five subcostals, yet has the distal areole elongate and the cell even shorter than in the *anseraria* group. Finally, I have one aberrant *A. albulata* in which SC<sup>5</sup> arises just proximally to the end of the outer areole. It is evident, therefore, that some other differential characters must be sought, or the assemblage be left undisturbed. I am content, for the present, to accept the latter alternative. *Minoa* should either be merged (as by Meyrick) or preferably restricted to its

genotype *M. murinata*, pending further research. The Indo-Australian genus *Poecilasthena* Warren, and still more the Holarctic *Oporinia* Hübner, differ more widely from *Asthena*; cf. Turner, *tom. cit.*, pp. 229, 231, to which should be added, in the case of *Oporinia*, that the frenulum is aborted, the resting posture different, the uncus fully developed, the heads of the labides united, and that the early stages are not comparable. *Poecilasthena* consists of: ten or eleven Australian species, one of which (*P. thalassias* Meyrick) extends to New Guinea, the South Moluccas, and even Malaya (subsp. div. ?), and has a close relative in Upper Burma (*P. burmensis* Prout, 1926); two species found in New Guinea; and two or three which occur in New Zealand.

The new species described below shows the general scheme of markings characteristic of the genus, or in particular of *A. euthecta* Turner, but even more recalls the *Psilocambogia* section of *Eois* Hübner (*E. memorata* Walker, *E. cymatodes* Meyrick, etc.), a genus which differs essentially from *Asthena* in having the areole simple and very small, or even entirely wanting, the first subcostal stalked well beyond the fifth, and the genitalia (so far as investigated) more *Anisodes*-like. In the species about to be described, there are no signs of definitely close affinity with any other known to me, and I shall not be surprised if the ♂ proves to possess some characteristic specialisations.

## 26. *Asthena eurychora*, sp. n.

♀, 23–24 mm. Face not broadened. Palpus with terminal segment distinct, projecting slightly in front of face. Antenna with minute ciliation and with single longer and stiffer hairs. Head, body, and wings buff, more whitish beneath.

*Fore wing* with cell short (not quite  $\frac{2}{3}$ ),  $SC^1$  very proximal at origin, both areoles very long,  $SC^1$  separating proximally to the apex of the outer one,  $R^1$  shortly stalked with  $SC^{3-5}$ ,  $M^1$  from before end of cell; rather glossy, very pale yellowish (not quite so bright as cartridge buff), with the irroration and markings dull cinnamon, sufficiently dense to give the wing a prevailing tone of pinkish buff; cell-dot mixed with black; lines crenulate, slightly bent near costa or (the outer ones) more evenly curved, mostly rather thick, in part mixed with grey, especially the first postmedian, which appears a little less crenulate than the rest; two subbasal not very sharply defined, the outer the thicker; two antemedian, rather irregular, perhaps more slender than the rest; sug-



gestions of longitudinal connection between these and the postmedian at bases of  $R^3-M^2$ ; postmedian double, the outer a little the more curved; subterminal triple, the proximal two dark-marked just in front of  $R^3$ ; termen with minute blackish dots at ends of veins. *Hind wing* with termen very weakly bent at  $R^3$ ; C anastomosing with SC to about  $\frac{2}{3}$  cell,  $SC^2$  very shortly stalked,  $M^1$  very well separated at origin from  $R^3$ ; subbasal lines wanting, antemedian both well proximal to cell-dot, weak anteriorly; the rest nearly as on fore wing, the postmedians somewhat outbent at middle, here subconfluent.

Under side almost unmarked.

Upolu: Malololelei, 3 ♀♀, 24.ii.1924.

A coloured figure will be published in Part III, Fascicle 4.

### GEOMETRINAE.

This gigantic assemblage, the BOARMIANAE [*sic*] of Hampson, SELIDOSEMIDAE of Meyrick, ENNOMINAE of Hulst, is comparatively weakly represented in Melanesia, and apparently—except for the species of the *Chogada* group of *Cleora*, which are often disproportionately dominant numerically—extremely weakly in Polynesia. Defective though our data remain in several respects, it will not be altogether without value to give here some statistical comparisons of the prevalence of this subfamily in various faunistic regions with that of the GEOMETRIDAE as a whole.

For the Palaearctic Region as understood by Staudinger and Rebel (*Cat. Lep. Palaearct.* 1901)—*i.e.* the region in which the small and obscure Geometrids such as *Sterrrha* and *Eupithecia* have been the least inadequately studied in relation to the rest, with a resultant prejudice to any apparent dominance of "BOARMIANAE"—there were recognised about 396 Boarmiids out of a total of 1233, or about 32 per cent. In Vol. IV of Seitz's "*Macrolepidoptera of the World*"—where we find a wider conception of the Palaearctic Region, including vast tracts of China in which investigation of the obscure genera in question has scarcely even commenced—I find the percentage of GEOMETRINAE has risen to 38.5 (some 870 species out of nearly 2,260).

With reference to Boreal America, Barnes and McDunnough in 1917 catalogued 516 GEOMETRINAE out of 1,047 GEOMETRIDAE, or 47 per cent. For

South America there is as yet no list, but here also the present subfamily certainly furnishes a very high percentage of the whole.

As regards tropical Africa also there is no list; for South Africa Janse (*Check-List*, 1917) gives 267 GEOMETRINAE out of 590 Geometrid species, namely between 44 and 45 per cent.

In British India Hampson (*Faun. Brit. Ind., Moths*, iii, 1895) recognised 1,063 species\* of the family, 480 of them (45 per cent.) being Boarmiids. In the wonderful collection made by Capt. A. E. Swann in the Kachin Hills, Upper Burma (*cf. Journ. Bomb. Nat. Hist. Soc.*, xxxi, 129-46, 309-22, 780-99, 932-50, 1926-27), the Boarmiids actually preponderated, numbering 175 species out of 329 (53 per cent.); and this notwithstanding the fact that Captain Swann paid particular attention to the small species.

The Malayan Subregion, when figures are available, may yield results similar to those furnished by the Indian; in working out the Geometrids of Dr. E. Mjöberg's valuable collections from some of the Mountains of Sarawak (*Sar. Mus. Journ.*, iii, Pt. II, No. 9, pp. 169-210, 1926) I found the 124 species to comprise 58 GEOMETRINAE, or nearly 47 per cent.

In Australia, out of about 950 described GEOMETRIDAE,† some 300 are "BOARMIANAE," just the same percentage as in Staudinger's Palaearctic Region. As regards New Zealand, Mr. Meyrick (*Tr. N. Z. Inst.*, xlix, 266, 1917) has already remarked on the very inadequate representation of the subfamily; Tillyard shows the figure to be 44 out of a total of 237 Geometrids, or not quite 20 per cent.

For New Guinea, the only papers yet published that can provide any basis for statistical calculations are three by Warren (*Nov. Zool.*, x, 343-414, 1903; xiii, 61-161, 1906; xiv, 97-186, 1907), describing the new species contained in some wonderfully rich collections made by Meek in the Owen Stanley Range. Although these papers do not enumerate the previously known species of which specimens were obtained, the proportion of novelties was so high that I believe

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\* Hampson's wholesale "lumpings" probably do not appreciably modify percentages, since they are impartially distributed between the subfamilies; their influence, if any, will tell in favour of this author's BOARMIANAE. The most glaring examples that occur to me are his *Boarmia acaciaria* and *Abraxa sylvata* ("BOARMIANAE"), and his *Sauris hirudinata* ("LARENTIANAE").

† Tillyard's recent census (*Ins. Austral. and N. Z.*, pp. 449-452, Nov. 1926) yields a total of 916, but this is not quite complete, since Dr. Turner's works on which it is based, admittedly exclude a number of species which he has been unable personally to examine.



the figures afford a fair index to the numerical strength of the respective sub-families in the district, and probably even in the mountains of New Guinea in general. It appears that, out of 473 new species, 171 (36 per cent.) belong to the GEOMETRINAE, which the author—as in all his papers—distributes amongst several untenable “subfamilies.”

A collection from Dampier I., Vulcan I., and the Admiralty Is. which I analysed for Lord Rothschild when it was received from Meek several years ago, contained representatives of about 140 species, of which only 34 were Boarmiid (between 24 and 25 per cent.). Several of these were common and widely distributed species, such as *Cleora inflexaria* Snellen and *C. decisaria* Walker, *Ectropis cessaria* Walker and *E. sabulosa* Warren, *Catoria delectaria* Walker, *Semiothisa goramata* Röber = *S. variegata* Warren, *Hyposidra talaca* Walker, *Borbacha euchrysa* Lower, *Petelia medardaria* Herrich-Schäffer, *Bulonga griseosericea* Pagenstecher and others, though sometimes redeemed from the commonplace by some racial modification. Of outstanding endemic developments there was scarcely a trace.

When we turn to Samoa, we find only 4 *Geometrinae* among our 30 species, and I doubt whether any other islands of the South Pacific would provide a much higher proportion, though the entirely dissimilar Hawaiian fauna gives the GEOMETRINAE more than a 2:1 majority over the LARENTHINAE, which is the only other Geometrid subfamily found there—the endemic genus *Scotorythra* and its immediate offshoots having obtained almost undisputed sway. Meyrick's “Descriptions of Lepidoptera from the South Pacific” (*Tr. Ent. Soc. Lond.*, 1886, pp. 190–212), out of 29 Geometrids, include only one Geometrine—*Boarmia psychastis*, of the New Hebrides, apparently a ♀ ab. of *Cleora decisaria*—together with a reference to another single ♀, from Samoa, “probably the same species,” or rather, in the light of present knowledge, No. 28 *infra*. Nearly every island produces at least one representative of this group, but otherwise I have searched almost in vain, through the collections to which I have access, for GEOMETRINAE. Two genera have, indeed, been erected for single species and call for brief notice here; but they seem to be offshoots (with ♂ specialisations) of the group last mentioned.

*Cerotracha* (type *C. licornaria* Guen., Tahiti) is perhaps generically separable from *Cleora* by its more slender build and extremely long antenna, in some measure linking that genus with *Scotorythra*. But *Alcis nausori* Bethune-Baker (*Proc. Zool. Soc. Lond.*, 1905, p. 94, t. viii, f. 6, Viti Levu), which has also rather

long wings and long antenna, is an obvious *Cleora* of the *Chogada* group. Warren's note on *Cerotricha* (*Nov. Zool.*, i, 377, 1894) was based on misconceptions, and must be ignored altogether.

*Aegitrichus* (type *A. lanaris* Butler, 1886, Fiji) is still only known from the much damaged ♂ type, and no definite opinion as to it can yet be expressed; but from all the appearances I should suppose it to be a *Cleora* (*Chogada*) with highly specialised ♂ hind wing, in which the posterior half is separated off into an excessively hairy lobe; all the other characters shown agree absolutely with those of the present group.

Of the four *Geometrinae* now known to occur in Samoa, two are "*Chogada*," while the other two extend respectively the range of an Indo-Australian genus (*Nadagara*), and that of a widely distributed Indo-Australian species (*Orsonoba clelia*), both of which were previously supposed to reach their eastern limit in the Solomon Islands.

### *Cleora* Curtis.

*Brit. Ent.*, ii, 88, 1825.—Turner, *Proc. Linn. Soc. N. S. Wales*, xlii, 370, 1917.—*Alcis* Curtis, *Brit. Ent.*, iii, 113, 1826.—Prout, *Ann. Transv. Mus.*, iii, 222, 1913.—*Chogada* Moore, *Lep. Ceyl.*, iii, 415, 1887.—*Selidosema* (? Hübner, *Verz.*, 299, 1825) Meyrick, *Tr. Ent. Soc. Lond.*, 1892, 105.—*Boarmia* part. (Treitschke, *Schmett. Eur.*, v, (2), 433, 1825) Hampson, *Faun. Brit. Ind.*, *Moths*, iii, 256, 1895.

In my preliminary dealings with the world's GEOMETRINAE—admittedly one of the most difficult of all the Lepidopterous subfamilies—I have perforce accepted in its broad outline Meyrick's conception of the nearly world-wide "genus" which he called *Selidosema*, but for which *Cleora* \* is probably a prior and certainly a safer name, *S. plumaria* Schiffermüller (the type of *Selidosema*) differing in several particulars and being usually considered *sui generis*, as by Lederer, Guenée, McDunnough and others. I am aware, however, that further subdivision will sooner or later be necessary; especially illuminating is McDunnough's fine essay, "*Studies in North American Cleorini*" (1920), in which he treats Hampson's BOARMIA as a tribe, and differentiates no less than twenty-three natural genera, according to characters derived from the genitalia,

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\* *Cleora* Curtis, 1 Oct., 1825; *Selidosema* Hübner, "late 1825 (post Aug.)," sec. Sherborn and Prout, if not even 1826.



venation, antenna, etc. It is to be feared that many years must elapse before anything of the kind is done with the mass of exotic material that is awaiting attention ; but fortunately the need is not urgent in connection with the present work, for Moore's *Chogada* can quite satisfactorily be left with *Cleora*, sens. str., as defined by McDunnough (*loc. cit.*, p. 19). Its type (*C. alienaria* Walker) differs chiefly from *Cleora cinctaria* in the rather longer palpus, longer primary pectinations and strongly dilated hind tibia of the ♂, and in the strongly marked under side. Vein SC<sup>2</sup> of the fore wing in *C. alienaria* and its nearest allies is much more rarely connected with SC<sup>3</sup> than in typical, Holarctic *Cleora*, but varies in both groups. The facies of what I have called the "*Chogada* group" (Indo-Australian and African) is nearly always unmistakable, but I cannot accept it as generic, since there are intergrades in all the characters mentioned ; e.g. *C. leucophaea* Butler, of Japan, with long pectinations, *C. displicata* Walker, of Queensland, with non-dilated hind tibia, several species with intermediate palpus, and a few—such as *C. fortunata* Blachier, of Teneriffe, with intermediate facies.

The number of species which have been confused under the name *C. "acaciaria* Boisduval" must be very great. Many of them have been found readily separable by wing-markings, when studied by good observers like Moore and Turner ; but some, which I confess to having supposed to be merely geographical forms, or sometimes even aberrations, are proved by the genitalia to be also totally distinct species. Mr. W. H. T. Tams, at the British Museum, has kindly made preparations of a very large number of forms, and the results are extraordinarily interesting. But the number that would require examination before any systematic revision could be made continues to increase rather than to diminish, and we must reluctantly relegate to the future all but the barest generalisations.

The numerous African forms for the most part differ markedly from the Indo-Australian, and show on the whole a somewhat simpler type of genitalia. One unnamed Ceylon species, of which only a single example is yet known, possibly originated from the same stem as the African forms, and as regards its genitalia is curiously remote from the rest of the Indo-Australian thus far examined. Only two of the Indo-Australian species seem to be really widely distributed : *C. injectaria* Walker (Ceylon) = *C. sublectaria* Walker (Ceylon) = *C. compactaria* Walker (Singapore), for which probably *C. processaria* Walker—unfortunately founded on an aberrant ♀ (Moulmein)—will prove the oldest

name ; and *C. decisaria* Walker (Ceram) = *C. callicrossa* Meyrick (New Guinea) = *C. lacteata* Warren (New Britain). The former has a race or exceedingly close ally in Fiji, and it will not be at all surprising if both it and *C. decisaria* are also found in Polynesia. I have before me a ♂ of a probable race of *C. decisaria* from Lifu, and a small worn ♂ (apparently more typical) from the New Hebrides, the latter presumably the ♂ of *C. psychastis* Meyrick (*vide supra*). Warren named several aberrations from the Kei Is. (*Nov. Zool.*, v, 430, 1898), and one from the Solomon Is. (*Nov. Zool.*, xii, 432, 1905) ; westward the species reaches Borneo and Java (Mt. Gedeh), and I have even seen one specimen from Penang.

The Samoan and other Polynesian *Cleora* belong, I suppose, to the same subgroup as *C. injectaria* and *C. decisaria*, and, on McDunnough's antennal character, would not be quite so strictly congeneric with *C. cinctaria* as the *alienaria* subgroup. They have still longer and more lax ♂ pectinations, which tend to curl irregularly round the shaft, and the slender secondary pectinations have disappeared—at least so far as can be determined without laborious anatomical research. I cannot see, however, that this difference is correlated with any other structural one ; all the African species have the antennal structure of the Polynesian, etc., while several of the Indo-Malayan—*C. alienaria* Walker, *C. gelidaria* Walker, *C. determinata* Walker, *C. concentraria* Snellen and some unnamed species together with the Australian *C. illustraria* Walker and the New Guinea *C. hospita* Prout—have the doubly bipectinate antenna of *C. cinctaria* Schiffermüller. It should be added that the very common *C. inflexaria* Snellen, which is an outlier of the present group and occurs in most localities from Malaya to the Solomon Is., shows variable and often asymmetrical antennal conditions similar to those noticed by Turner (*Tr. Roy. Soc. S. Austral.*, xxviii, 230, 1904 ; *Proc. Linn. Soc. N. S. Wales*, xlii, 333, 1917) under "*Ectropis*" *hemiprosopa* Turner and "*E.*" *camelaria* Guenée, except that in that group (the genus *Catoria* of Moore) the geminate branches are of approximately equal width, whereas in *Cleora inflexaria* one branch is extremely slender, as in *C. cinctaria*. This species (*C. inflexaria*) will perhaps be found to inhabit Polynesia also, and it is not impossible that one or more representatives of *Catoria* may likewise be discovered there ; both the white group (*camelaria* group) and the green (*delectaria* [Walker] group) are very widely distributed, and reach the Bismarck Archipelago and the Solomon Islands.



27. *Cleora samoana* (Butler) (pl. V, figs. 1-18).

*Boarmia samoana* Butler, *Proc. Zool. Soc. Lond.*, 1886, p. 433, 1886 (Samoa).

*Boarmia acaciaria samoana* Rebel, *Denkschr. K. Akad. Wiss. Wien, Math.-Naturw. Kl.*, lxxxv, 429, t. xviii, f. 5, 6, 15, 1910 (Samoa).

Upolu : Apia, Vailima, Malololelei, a series of 160 ♂♂, 100 ♀♀, taken in every month of the year (various collectors).

"Tutuila," iv.1918, 1 ♂ (Kellers). Tutuila : Pago Pago, 1 ♂, 8.ix.1923 ; 1 ♂, 9.ix.1923 ; 1 ♂, 10.ix.1923 ; 10 ♂♂, 2 ♀♀ ; 14.ix.1923 ; 2 ♂♂, 1 ♀, 18.ix.1923 ; 1 ♀, 21.ix.1923 ; 6 ♂♂, i.1924 ; 10 ♂♂ 3 ♀♀, ii.1924 (Steffany).

Savaii : Palauli, 1 ♂, 1 ♀, 8.viii.1924 ; Salailua, 2 ♂♂, 12.viii.1924.

Manu'a : Ofu, 1 ♂, 27.ii.1926 (Judd). "Samoa," 3 ♂♂, 2 ♀♀, 1920 ; 2 ♂♂, iii.-viii.1921 (O'Connor).

It has already been noticed by Rebel that this is an excessively variable species, and the long series of specimens, mostly of very small size, collected by Woodford for the Tring Museum, showed similar variability. But the material now brought together is so extraordinarily interesting that it has been thought desirable to figure (pl. V) a representative series of the most remarkable forms. In order to produce a more striking effect, we have drawn exclusively on the wonderful series collected at light by Mr. Hopkins on a single night (Upolu : Vailima, 7.ix.1925) ; and even with this restriction, the task of selection has been difficult, many of the minor variations having inevitably been left out. Perhaps the most usual forms of the ♂ are whitish- or yellowish-brown, more or less heavily dark-irrorated and mottled, with no extremely sharp colour contrasts ; the ♀♀ are on an average much whiter, and in consequence more definitely or sharply marked. The cell-marks are always large or fairly so, on the under side dark, on the upper side forming faint rings or ocelli (as in pl. V, figs. 15, 16, etc.), or strong ones (figs. 4, 13, 17, etc.), or solid black spots (figs. 7, 8, 12, etc.). The ante- and postmedian lines are always traceable, though varying greatly in distinctness ; the antemedian (as in allied species) is often duplicated proximally in blackish or brown, and very occasionally (as in fig. 15) these two lines may be fused into a narrow band ; the postmedian very occasionally (as in fig. 14) suggests the presence of a similar companion line distally, but is usually succeeded merely by an indefinite buff, cinnamon or tawny shade, as in most of the allies, and even this may be absent. The median line is extremely variable, sometimes (except at the costa) weak or wanting (see figs. 7, 12, 16), sometimes strong (figs. 14, 15), some-

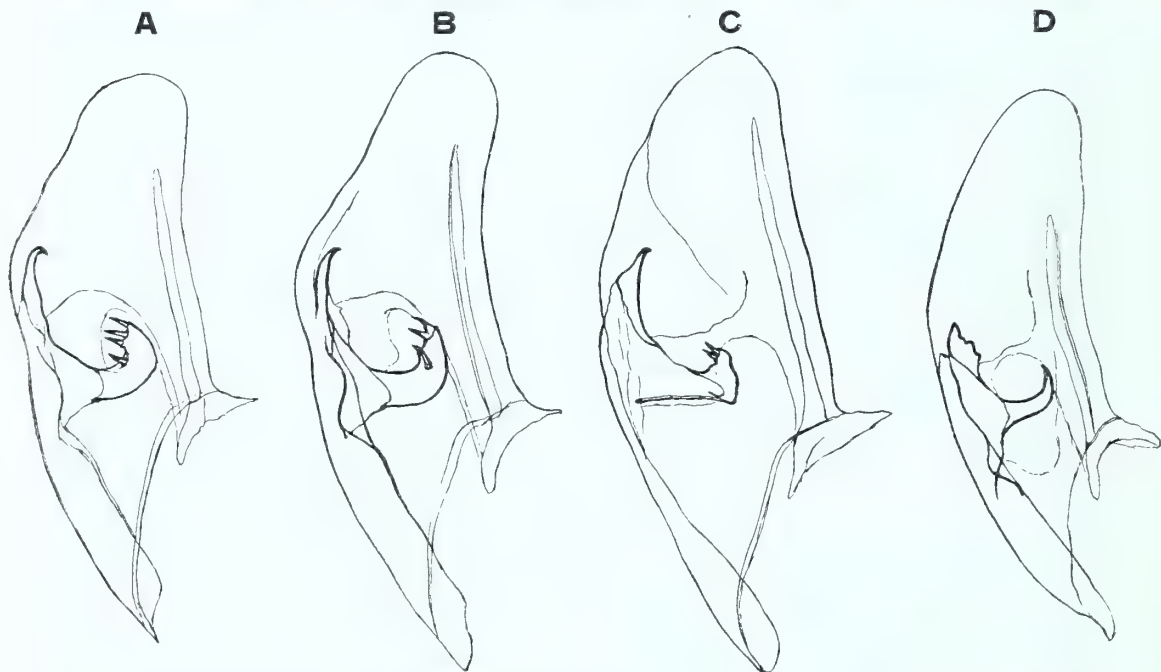
times the strongest and blackest of all the markings (fig. 11) or developed into a band (fig. 2). Even the tendency shown in some of the allies (*e.g.* *C. injectaria* Walker and *C. immemorata* Walker) for this strong median line to throw out a longitudinal branch across the postmedian in front of  $R^3$  occasionally manifests itself (fig. 15), or is indicated by blurred or diffuse darkening (fig. 3). As regards the general distribution of the colours, there is endless variation; definitely banded forms may have the median area white and the rest dark or red-brown (*cf.* figs. 7 and 17), or—at least on the fore wing and anterior part of the hind wing—the antithesis of this, the median area being blackened and the rest more or less pale (see fig. 1); or the white areas may be partly suffused (figs. 4, 13) or more proximal (fig. 11) or more restricted (fig. 3), or—somewhat similarly—a dark central band may be restricted to the area between median and postmedian. An extreme, rare ab. (fig. 6) is almost entirely blackened, leaving only the base and apex of the fore wing pale. One ♂ (not figured) has the cell-spots abnormally enlarged. Other phases of variation, which it is impossible to discuss in detail, may be gathered from a study of the plate or of the general tendencies of the polymorphism known in the other most variable Indo-Australian *Cleora*—*inflexaria* Snellen.

Finally, mention must be made of some teratological variations. Apart from the very great discrepancies in size—ranging from 30 mm. or less up to 46 mm., and apparently not seasonal—there are occasional deviations from the normal shape. Particularly curious is the fine ♀ aberration (pl. V, fig. 11) in which the right fore wing is somewhat shortened, and the right hind wing definitely enlarged. In a somewhat analogous aberration of the ♂, with broader black median shading, *both* hind wings are somewhat produced in the middle, though not absolutely symmetrically.

Concerning the probable origin of *C. samoana*, little can be said. It has nothing directly to do with *C. "acaciaria,"* nor even with *C. alienaria* Walker, the species which Hampson (*Faun. Brit. Ind., Moths*, iii, fig. 137, 1895) figures under that name; probably Rebel (*loc. cit. supra*) was misled by Hampson's absurd "lumping," and made no independent investigation. From the rather narrow wings, prevalence of brown colouring, pronounced outward curve of the postmedian of the fore wing at the radials (one of the very few comparative constants in its scheme), and strongly clouded or banded under side, one might have supposed it to be a representative, if not even a subspecies, of *C. injectaria* Walker, but the genitalia do not altogether bear out this assumption. I can



only say that our researches have not shown us anything less far from *C. samoana* than this, excepting that the *Cleora* that occurs in the Tonga Is. is unequivocally *C. samoana*. We give figures (Text-fig. 1) of the valvae of topotypical *C. injectaria* (Ceylon), the subspecies (?) *compactaria* from Singapore and the more



TEXT-FIG. 1.—Valvae of males of *Cleora injectaria* from Ceylon (A) ; *C. injectaria compactaria* from Singapore (B) ; *C. injectaria* subsp ? from Fiji (C) ; *C. samoana* (D). Drawn by W. H. T. Tams.

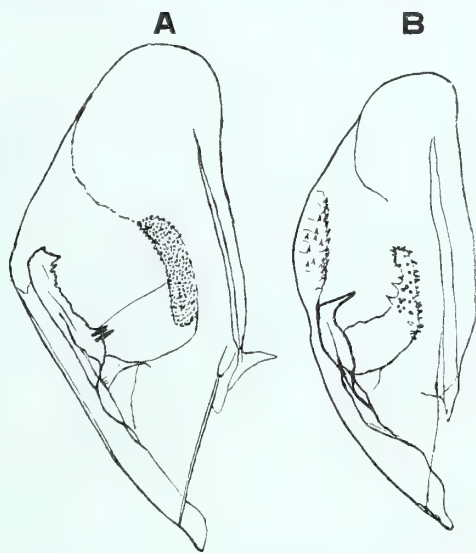
divergent Fiji representative (at present unnamed), side by side with those of *C. samoana*. Species with similar facies but still more dissimilar genitalia are *C. lichenina* Butler\* (Loyalty Is.), *C. immemorata* Walker (New Caledonia), and two small, unnamed species respectively found in Tahiti and the Marquesas Is.

## 28. *Cleora hemiopa*, sp. n. (Text-fig. 2 B).

♂, 32–34 mm. ; ♀, 34–36 mm. Distinguishable from *C. samoana* as follows : Antenna of ♂ pectinate to scarcely  $\frac{3}{4}$ . Valva of ♂ with entirely different

\* Founded on a fairly large ♀ which has not yet been matched, but I think that Warren and I are correct in associating it with the close relative (? form) of *C. immemorata*, to which I here apply the name, and not with the other known Loyalty Islands *Cleora*, which is much nearer to *C. decisaria*.

armature (Text-fig. 2, B). Fovea of ♂ smaller, formed as in *C. decisaria* Walker, i.e. on the upper side with a small circular ridge in posterior half (adjoining SM<sup>2</sup>) enclosing a rosette of fine and small, sharply black scales, which radiate from a white centre. *Fore wing* relatively a trifle broader, with the termen appreciably less oblique; much less brown and more weakly marked than in most specimens of *C. samoana*, of a more dead white than the whitest aberrations thereof, without fuscous or blackish irroration, in both sexes altogether recalling weakly marked *C. decisaria*, though slightly more tinged with brown; cell-mark only narrowly dark-shaded proximally and distally; postmedian line more regularly crenulate throughout, and without the pronounced loop outward at the radials, in this again rather closely resembling *C. decisaria*; ♀ with a conspicuous black dot in the position of the specialised patch of the ♂ fovea (as in some *C. decisaria* ♀♀). *Hind wing* similarly pale and weakly marked, with large raised white scales in end of cell and again beyond, much as in *C. decisaria*; a small black cell-dot, not developed into the usual ocellus of the genus. Under side dirty whitish, with the cell-spot of the fore wing rather smaller than in *C. samoana*, that of the hind wing small and weak, the postmedian of both wings little sinuous, weak posteriorly, the subterminal dark shades narrow, weak except anteriorly (a little stronger in the ♀♀ than in the ♂♂).



TEXT-FIG. 2.—Valvae of males of *Cleora decisaria* from Key Islands (A); *C. hemiopa* from Upolu, Samoa (B). Drawn by W. H. T. Tams.

Upolu: 2 ♂♂, in *Zool. Mus. Berlin* (Friedländer); Apia, 1 ♂, 16.v.1923 (Armstrong); type ♂, 14.v.1924 (Armstrong); 1 ♂, 24.v.1924; 1 ♂ (valva figured), 27.viii.1924; allotype ♀, 12.x.1922 (Armstrong); 1 ♀, 1.xi.1924.

Savaii: Palauli, 8.viii.1924.

Apart from the very different armature of the valva (harpe of Pierce, *Genit. Geometr.*, etc., 1914), I should have regarded this as a race of *C. decisaria* Walker. A figure of the valva of a Kei Is. *C. decisaria* is given for comparison. The



only species yet known to me having the type of fovea to which attention is here called are: *C. displicata* Walker (Queensland: structurally distinct in the non-dilated hind tibia of the ♂, and in the absence of the tufts of raised scaling, except the slight ones of the cell-spots); *C. mjöbergi* Prout (Borneo: a large species, with entirely dissimilar facies and also lacking the raised scaling); and the immediate circle of *C. decisaria*. The members of the latter agree so closely in many respects that they must surely have had a common origin; a specimen from the Philippines, belonging to an unnamed species, has the central armature of the valva somewhat similar to that of *C. hemiopa*, but has a longer and stronger marginal hooked process than that in *C. decisaria*; another (also unnamed) example, from Lifu, has not been studied anatomically, but may well represent a weakly marked race of *C. decisaria*, with a rather strong dark mark on the post-median of the fore wing at, and just in front of, vein R<sup>3</sup>.

### Orsonoba Walker.

*List Lep. Ins.*, xx, 218, 1860.—Moore, *Lep. Ceyl.*, iii, 394, 1887.—Hampson, *Faun. Brit. Ind., Moths*, iii, 211, 1895.—Turner, *Proc. Linn. Soc. N. S. Wales*, xlv, 286, 1919.

This genus was erected solely for *P. clelia* Cramer (under its synonym *O. rajaca* Walker, *t. cit.*, 219, Ceylon), which remains the only well-known and widely distributed species. Its two closest allies are *O. variaria* Leech (1897, W. China), and *O. aethocrypta* Prout (1927, Upper Burma). A somewhat more distant relative is *O. zapluta* Turner (1904, Queensland). “*Erosia*” *hyperbolica* Swinhoe, which Hampson (overlooking the pectinate ♀ antenna!) pronounces to be “a dwarf (30 mm.) brownish ochreous female” of *O. clelia*, and of which the type was taken at Karachi, and two kindred Mediterranean species (*Coenina dentataria* Swinhoe and *O. paulusi* Rebel) have narrower wings and are better referred to the African genus *Coenina* Walker (*vide* Seitz, *Macrolep.*, iv, 349, 1915).

In the Malayan and Papuan Subregions, the branchings from *Orsonoba*, which I assume from its range to be the phylogenetically older form, have proceeded along other lines. An endemic Australian genus, *Proboloptera* (? Meyrick) Turner (*Proc. Linn. Soc. N. S. Wales*, xlv, 287, 1919), unknown to me in nature, is said to differ from it in having the antenna pectinate to the apex, and the frons with a rounded or conical corneous projection. Another genus, *Xylino-phylla* Warren = *Adelphocrasta* Warren, is almost as widely distributed as

*Orsonoba* itself, from which it differs little except in the simple antennae of both sexes and some details of shape. Its range, as at present known, is from Penang to the Solomon Is., and I consider it quite likely to be met with in Polynesia.

It is perhaps necessary to point out that there is no possible justification for transferring the name *Gonodontis* Hübner to the present genus, notwithstanding that Warren (*Proc. Zool. Soc. Lond.*, 1893, p. 398, 1893) gave the following citation: "Type, *G. clelia* Cramer." The diagnoses of the Familia in which Hübner places it, and of the Coitus *Gonodontis* itself, require a pale (not concolorous) hind wing, a regular, but dentate, termen to the latter, and the presence of annular cell-spots on *both* wings; hence it was quite certainly founded on *G. dentaria* Hübner (*G. bidentata* Clerck), to which were added, as a kind of afterthought, the discordant species *G. anceta* Cramer and *G. clelia* Cramer. Moreover, Geyer (*Zutr. Exot. Schmett.*, v, 14, 1837), in describing *Polygonia cingillaria* and comparing it with "*Gonodontis clelia*," expressly states that the latter really belongs to a new genus together with *P. cingillaria*—i.e. he transfers it to his *Polygonia* (nec Hübner). Since Rogenhofer in 1885 resuscitated *Gonodontis* for *G. bidentata*, in lieu of *Odontopera* Stephens, the name has very generally been used in that sense, in which its validity has never been questioned.

## 29. *Orsonoba clelia* (Cramer).

*Utl. Kapell.*, iii, (24), 172 and 174, t. 288 B, C, 1780 (Coromandel Coast).—Hampson, *Faun. Brit. Ind., Moth.*, iii, 212, 1895.

*Orsonoba rajaca* Walker, *List Lep. Ins.*, xx, 219, 1860 (Ceylon).—Moore, *Lep. Ceyl.*, iii, 395, t. 187, f. 1, 1b, 1887.

*Orsonoba pallida* Butler, *Ann. Mag. Nat. Hist.*, (5), vi, 125, 1880; *Ill. Het.*, vi, 53, t. 114, f. 5, 1886 (N. E. Himalaya).

*Arrhodia orthotoma* Lower, *Tr. Roy. Soc. S. Austral.*, xviii, 83, 1895 (Queensland, type in Mus. Tring, erroneously identified by Warren as *Proboloptera embolias* Meyrick).

Upolu: Apia, 1 ♀, 10.v.1922 (Armstrong).

Tutuila: Pago Pago, 2 ♂♂, x.1923, i.1924 (Steffany).

Previously known range: Ceylon, India, Burma, Penang, Hainan, Formosa, Java, Flores, South Moluccas, Queensland, New Britain, Solomon Is. (Bougainville, Florida, Tulagi, Gizo, Vella Lavella).

In this species sexual demorphism is pronounced and individual variability moderate, but I have not yet detected any sign of the formation of races. Notwithstanding its extremely wide distribution, *O. clelia* is very far from being a pest, and the scantiness of the Samoan records is in keeping with most of



our previous experiences of it. The larva is said to feed on Convolvulaceae, and to be olive-fuscous with small dorsal prominences on the second and eighth abdominal segments.

### Nadagara Walker.

*List Lep. Ins.*, xxiv, 1092, 1862.—Hampson, *Faun. Brit. Ind.*, *Moths*, iii, 193, 1895.—Turner, *Proc. Linn. Soc. N. S. Wales*, xlv, 284, 1919.

An exclusively Indo-Australian genus of moderate extent, the species mostly pretty uniform in structure and facies, but including a few aberrant forms which render its demarcation rather difficult. Turner's diagnosis (*loc. cit.*) is good, but he had very little material and no ♂, and was unaware of some points in which there is variability: (1) the long stalk of SC<sup>1-2</sup> by no means always anastomoses with C; (2) the ♂ hind tibia is dilated in about three-fifths of the species ("not dilated" was quoted from Hampson). The rather acute apex of the fore wing, and the more or less wavy distal margins are generally characteristic. M<sup>1</sup> of the fore wing generally arises close to the hind angle of the cell, but is occasionally (as in *N. argyrosticha* Turner) considerably more proximal. In the same species, R<sup>2</sup> of the fore wing arises well before the middle of DC, while *N. synodoneura* Prout is still more advanced in this respect, having the origins of R<sup>1</sup> and R<sup>2</sup> very close together; in the latter species it may possibly be a ♂ character only, the ♀ being still unknown.

The previously known range of the genus extended from India to the Bismarck Archipelago and the Solomon Is. The variable and interesting Samoan species is, I suppose, nearest to *N. extractata* Prout (Lousiade Archipelago). Since the descriptions of the species are very scattered and the genus has never been handled as a whole, I offer a provisional key, together with a few supplementary notes.

- |   |                                  |
|---|----------------------------------|
| 1. Palpus and face-cone moderate ( <i>huj. gen. ?</i> ) . . . . .                                 | 2                                |
| Palpus and face-cone long . . . . .   | 3                                |
| 2. Dark, with termen of fore wing subconcave anteriorly . . . . .                                 | <i>umbrifera</i> Wileman (1910). |
| Not dark, termen not subconcave . . . . .   | <i>cuneigera</i> Warren (1906).  |
| 3. Postmedian line of fore wing at hind margin close to costal end of that of hind wing . . . . . | 4                                |
| Postmedian line of fore wing ending well before costal end of that of hind wing . . . . .         | 16                               |
| 4. Fore wing with R <sup>2</sup> arising near R <sup>1</sup> (♀ unknown) . . . . .                | <i>synodoneura</i> Prout (1923). |
| Fore wing with R <sup>2</sup> normal . . . . .  | 5                                |

- |   |                                      |    |
|---|--------------------------------------|----|
| 5. Fore wing with cell-dot enlarged . . . . .   | <i>orbipuncta</i> Prout (1925).      |    |
| Fore wing with cell-dot not enlarged . . . . .  |                                      | 6  |
| 6. Rufescent or ochraceous, generally larger . . . . .  |                                      | 7  |
| Griscent, at least in ground-colour, not large . . . . .                                      |                                      | 10 |
| 7. Hind wing with termen dentate, bent in middle . . . . .                                    | <i>odontias</i> Prout (1923).        |    |
| Hind wing with termen rounded, at most subcrenulate . . . . .                                 |                                      | 8  |
| 8. Hind wing beneath with dark apical patch and enlarged cell-spot . . . . .                  | sp. n., Samoa.                       |    |
| Hind wing beneath not so . . . . .  |                                      | 9  |
| 9. Fore wing yellowish, antemedian line vertical posteriorly . . . . .                        | <i>juvenitaria</i> Guenée (1858).    |    |
| Fore wing reddish, antemedian line strongly oblique posteriorly . . . . .                     | <i>epopsioneura</i> Prout (1926).    |    |
| 10. Postmedian line of both wings denticulate . . . . .                                       |                                      | 11 |
| Postmedian line of hind wing not denticulate . . . . .  |                                      | 12 |
| 11. Postmedian lines meeting, their denticulation slight . . . . .                            | (A) <i>tractata</i> Prout (1916).    |    |
| Postmedian of hind wing at costa more proximal, denticulation of postmedian deeper . . . . .  | <i>intractata</i> Walker (1862).     |    |
| 12. Fore wing with blackish apical maculation . . . . .                                       |                                      | 13 |
| Fore wing without blackish apical maculation . . . . .  |                                      | 14 |
| 13. Fore wing variegated with reddish subapically . . . . .                                   | (B) <i>inordinata</i> Walker (1862). |    |
| Fore wing not variegated with reddish subapically . . . . .                                   | (B) <i>vigaia</i> Walker (1862).     |    |
| 14. Fore wing with postmedian line denticulate . . . . .                                      | <i>scitilineata</i> Walker (1862).   |    |
| Fore wing with postmedian line not denticulate . . . . .                                      |                                      | 15 |
| 15. Fore wing 18 mm. long, with apex produced . . . . .                                       | <i>dohertyi</i> Prout (1925).        |    |
| Fore wing not more than 15 mm., with apex not produced . . . . .                              | <i>comprehensata</i> Walker (1862).  |    |
| 16. Griscent or variegated . . . . .  |                                      | 17 |
| Rufescent or avellaneous . . . . .  |                                      | 19 |
| 17. Fore wing with apex produced, postmedian line single . . . . .                            |                                      | 18 |
| Fore wing with apex not appreciably produced, postmedian line duplicated proximally . . . . . | <i>synocha</i> Prout (1923)          |    |
| 18. Under side with strong subterminal dark shades, at least apically . . . . .               | (A) <i>extractata</i> Prout (1923).  |    |
| Under side without strong subterminal dark shades . . . . .                                   | (A) <i>irretracta</i> Warren (1899). |    |
| 19. A dark line indicated midway between subterminal and termen . . . . .                     | <i>argyrosticha</i> Turner (1919).   |    |
| No dark line indicated midway between subterminal and termen . . . . .                        |                                      | 20 |
| 20. Wings subcrenulate, beneath sharply marked . . . . .                                      | <i>reprensata</i> Prout (1916).      |    |
| Larger, wings smooth-margined, redder, beneath weakly marked . . . . .                        | <i>extensipennis</i> Prout (1923).   |    |

NOTE (A).—These three are probably races, in some measure linked up by others not yet named; *N. irretracta* is known to occur in the Bismarck Archipelago, and in Gizo and Tulagi (Solomon Is., off Isabel), and the Queensland form would work down to it in our key; *N. extractata* represents it in the Louisiade Archipelago, and *N. tractata* (Rook I.) may be a further race. The new Samoan species is probably developed from this, the most easterly, group.

NOTE (B).—I am coming increasingly to think that *N. vigaia* and *N. inordinata* are merely forms of a single species. The *vigaia* forms are most frequently (though not invariably) ♀, the *inordinata* forms more often ♂. Distribution, according to present determinations, seems



somewhat confused: Ceylon, Nilgiris, Bhutan, Java, and Sumatra for *N. vigaia*; Sikkim, Assam, Formosa, Malaya, Borneo, and Celebes for *N. inordinata*.

Grouped first by the structure of the ♂ hind leg and then regionally, the forms of *Nadagara* present themselves as follows:

I. *Hind tibia of ♂ not dilated*:

FORMOSAN: *N. umbrifera* (huj. gen. ?).

INDO-MALAYAN: *N. vigaia* and *N. inordinata* (see note B, *supra*), *N. orbipuncta* (N.W. India), *N. epopsioneura* (N.E. India), *N. synocha* (Malaya, Java, Sumatra), *N. intractata* (Borneo, Singapore).

PAPUAN: *N. cuneigera* (huj. gen. ?).

II. *Hind tibia of ♂ dilated*:

MALAYAN: *N. comprehensata* (Andaman Is., Nicobar Is., Penang, Borneo, Toekan Besi), *N. scitilineata* (Borneo, Perak, Hainan), *N. odontias* (Perak), *N. reprehensata* (Java, Perak).

MOLUCCAN: *N. dohertyi* (Batjan).

MELANESIAN: *N. extractata*, *N. tractata* and *N. irretracta* (see note B, *supra*), *N. extensipennis* (British New Guinea, Rook I.), *N. synodoneura* (Dutch and British New Guinea).

AUSTRALIAN: ? *N. argyrosticha* Turner (Queensland)—♂ unknown, but the species almost certainly belongs to the same group as *N. extensipennis* and *N. synodoneura*.

POLYNESIAN: sp. n., Samoa.

From the above outline, it is clear that there are still many lacunae in our knowledge of the geographical distribution of the known species, as indeed is the case with all but a few of the most conspicuous of the Indo-Australian genera of *Geometridae*. I think, however, that we already know enough to support the view that the higher "secondary sexual" developments in this genus are eastern and the simpler forms western, and the consequent expectation that any further Polynesian *Nadagara* that may be discovered will belong to our Group II—probably, if one may hazard a more definite guess, to the vicinity again of *N. irretracta*. It will be noticed that of the eight species recorded from the Malay Peninsula and the Greater Sunda Is., four belong to each group, whereas all the four known to occur in India are in Group I and all the Melanesian

in Group II, excepting only *N. cuneigera*, in which even the wing-pattern, as well as the structure of the head, suggests an interloper. Unfortunately I have been obliged to omit from these statistics one Bornean species, since I know only ♀♀ of it; this is *N. juveninaria* Guen. (*Spec. Gén. Léop.*, ix, 103, 1858) = *pulchrilineata* Walk. (*List. Lep. Ins.*, xxiv, 1095, 1862).

The following, which were described under *Nadagara*, are to be excluded from the genus: *N. grisea* Butler (1883), *N. punctilinearia* and *N. albovenaria* Leech (1897), *N. diversilineata* Warren (1896), *N. obrussata* Holland (1900), and *N. camura* Joicey and Talbot (1917).

### 30. *Nadagara hypomerops*, sp. n.

♂♀, 35–37 mm. Head and front of thorax reddish-brown, more or less intermingled with darker colouring. Palpus rather over 2, with the terminal segment markedly elongate, especially in the ♀. Thorax and abdomen pale (pinkish-buff or pinkish-cinnamon), more or less mixed, especially in the ♀, with red-brown. Hind tibia in ♂ dilated, with hair-pencil, the abdominal spine long and slender.

*Fore wing* moderately broad, termen not extremely oblique, waved to faintly crenulate, with the concavity between apex and SC<sup>5</sup> rather pronounced; stalk of SC<sup>1-2</sup> anastomosing well with C; rather variable in colour, as far as the postmedian line (especially in the central area) light ochreous in the ♂, more tawny in the ♀, the distal area in the ♂ inclining to pale vinaceous drab, in the ♀ generally scarcely differentiated, in both sexes with some dark-grey irroration; costal edge pale, with dark dashes and longer streaks; cell-dot blackish; ante-median line variable, rarely well expressed (sometimes almost entirely obsolete, nearly always so anteriorly), very oblique outward to cell-fold, then more or less oblique inward; postmedian white, finely dark-edged proximally, anteriorly about 2 mm. from termen, from R<sup>1</sup> becoming oblique, wavy and with very slight inward curves between the radials and between R<sup>3</sup> and SM<sup>2</sup>, reaching hind margin at about  $\frac{2}{3}$ ; terminal line fine, becoming thicker and blacker in front of SC<sup>5</sup>; fringe slightly reddened, with indications of a pale line at base and pale tips, sometimes dark-spotted opposite the veins. *Hind wing* with termen somewhat crenulate in the ♂, more so in the ♀; concolorous with fore wing, extreme base pale, in strongly marked specimens bounded by a continuation of the ante-median line; cell-dot enlarged, but ill-defined; postmedian line straightish, little beyond middle, continuing that of fore wing; traces of a wavy subterminal.



Under side variegated and variable, always with strong dark strigulae ; ground-colour whitish, showing chiefly in a broad band outside the postmedian (which on fore wing is straightish and little more oblique than termen, reaching costa about 5 mm. from apex), also on the fore wing in an apical dash, on the hind wing in a terminal band between  $R^3$  and tornus ; the rest suffused with shades of yellow-brown or red-brown, on the hind wing with a large, dark greyish-brown apical patch, which is otherwise only developed in *N. tractata* Prout, though foreshadowed in *N. intractata* Walker ; cell-dots sharply black, on the hind wing large.

The most outstanding aberration—1 ♂, 4 ♀♀—has a strong fuscous shade proximally to the postmedian, broadest on the under side, and on the upper side a narrower one distally to the antemedian. One or two ♀♀ are slightly transitional.

Upolu : Malololelei, type ♂, 16.vi.1924 ; 1 ♂ ab., 21.iv.1925 ; 1 ♀ ab., 12.ii.1924 ; 1 ♀ ab., 20.vi.1924 ; allotype ♀, 21.vi.1924 ; 2 ♀♀, 25, 28.vi.1924 ; 1 ♀ ab., 2.vii.1924 (Armstrong) ; 1 ♀, vii.1925 (Wilder) ; 2 ♀♀, 22.xi.1924 ; 1 ♀, intermediate, 2,000 feet, 5.xii.1925 ; Apia, 1 typical ♀, 1 ♀ ab., x.1924.

A coloured figure of this species will appear in Part III, Fascicle 4.

#### EXPLANATION OF TEXT-FIGURES AND PLATE.

Text-fig. 1. Valvae of males of *Cleora injectaria* from Ceylon (*A*) ; *C. injectaria compactaria* from Singapore (*B*) ; *C. injectaria* subsp ? from Fiji (*C*) ; *C. samoana* (*D*). Drawn by W. H. T. Tams.

„ 2. Valvae of males of *Cleroa decisaria* from Key Islands (*A*) ; *C. hemiopa* from Upolu, Samoa (*B*). Drawn by W. H. T. Tams.

Plate V. Aberrations of *Cleora samoana*, all taken at Vailima, Upolu, Samoa, 7th September, 1925 (G. H. E. Hopkins).



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PLATE V.

7

Aberations of *Cleora samonensis*, Butler. (Natural size.)

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Under side somewhat and variable, always with strong dark strigulae; ground colour slaty, showing chiefly in a broad band outside the postmedian (which on fore wing is straightish and little more oblique than termen, reaching costa about 2/3 way from apex), also on the fore wing in an apical dash, on the hind wing in a terminal band between  $R^3$  and tornus; the rest suffused with shades of greenish brown or red-brown, on the hind wing with a large, dark greyish-brown apical patch, which is otherwise only developed in *N. tractata* Prout, though less continued in *N. intraclata* Walker; cell-dots sharply black, on the hind wing large.

The most outstanding aberration—1 ♂, 4 ♀♀—has a strong fuscous shade proximally to the postmedian **PLATE V.** on the under side, and on the upper side a narrower one distally to the antemedian. One or two ♀♀ are slightly transitional.

Upolu. Maladetae type 7. 16.vi.1924: 1 ♂ ab., 21.iv.1925; 1 ♀ ab., 12.ii.1924; 1 ♂ ab., 2.viii.1924; 1 ♂ ab., 21.vi.1924: 2 ♀♀, 25, 28.vi.1924; 1 ♀ ab., 2.viii.1924 (all from G. H. E. Hopkins); 2 ♀♀, 22.xi.1924; 1 ♀, intermediate, 2,000 feet, 5.xii.1924; Apia. Common: 1 ♂ ab., x.1924.

**Aberrations of *Cleora samoana*, Butler. (Natural size.)**

A coloured figure of this species will appear in Part III. (Illustrations.)

**EXPLANATION OF TEXT-FIGURES AND PLATE.**

Text-fig. 1. Valvae of males of *Cleora injectaria* from Ceylon (A); *C. injectaria* from Singapore (B); *C. injectaria* subsp. ? from Fiji (C); *C. samoana* (D). Drawn by W. H. T. Tams.

„ 2. Valvae of males of *Cleora decisaria* from Key Islands (A); *C. hemiopa* from Upolu, Samoa (B). Drawn by W. H. T. Tams.

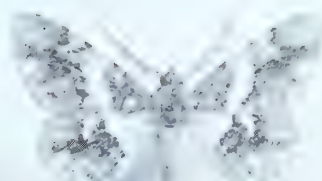
Plate V. Aberrations of *Cleora samoana*, all taken at Vailima, Upolu, Samoa, 7th September, 1925 (G. H. E. Hopkins).



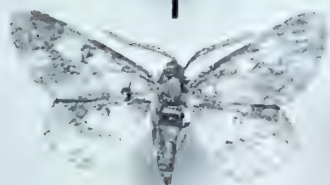
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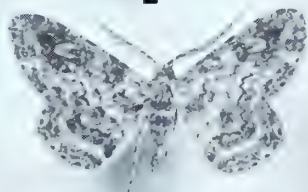
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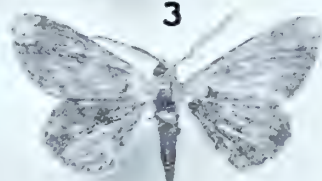
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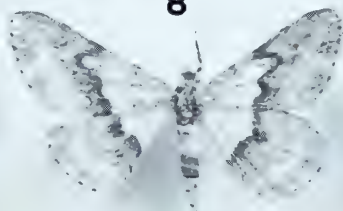
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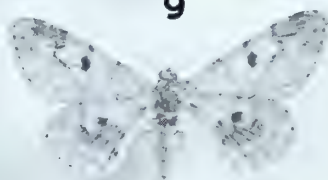
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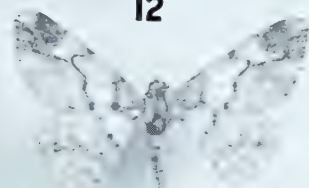
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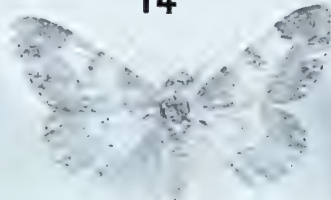
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# INSECTS OF SAMOA AND OTHER SAMOAN TERRESTRIAL ARTHROPODA

## PROPOSED ARRANGEMENT :—

- Part I. Orthoptera and Dermaptera.
- „ II. Hemiptera.
- „ III. Lepidoptera.
- „ IV. Coleoptera.
- „ V. Hymenoptera.
- „ VI. Diptera.
- „ VII. Other Orders of Insects.
- „ VIII. Terrestrial Arthropoda other than Insects.

The work will be published at intervals in the form of numbered fascicles. Although individual fascicles may contain contributions by more than one author, each fascicle will be so arranged as to form an integral portion of one or other of the Parts specified above.











